KITOI BAY HATCHERY ANNUAL MANAGEMENT PLAN, 2003

By

Steven G. Honnold
and
Andrew W. Aro

Regional Information Report[1] No. 4K03-39

Alaska Department of Fish and Game
Division of Commercial Fisheries
211 Mission Road
Kodiak, AK 99615

July 2003

[1]The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished division reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries.

AUTHORS

Steven G. Honnold is the Region IV Resource and Development Biologist, Alaska Department of Fish and Game, Division of Commercial Fisheries, 211 Mission Road, Kodiak, Alaska 99615.

Andrew W. Aro is the Kitoi Bay Hatchery Manager, an employee of the Kodiak Regional Aquaculture Association, Kitoi Bay Hatchery, PO Box KKB, Kodiak, Alaska 99697.

PROJECT SPONSORSHIP

Kitoi Bay Hatchery operations are funded by the Kodiak Regional Aquaculture Association (KRAA). In addition, all evaluations of hatchery salmon stocking programs are funded by KRAA.

ACKNOWLEDGMENTS

Thanks to Lucinda Neel for her publication expertise. Patti Nelson provided supervisory direction. Larry Malloy provided the KRAA fish transport permits and Appendix G. Thanks to Jim McCullough, Kevin Brennan, and Len Schwarz who provided editorial comments.

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

KITOI BAY HATCHERY ANNUAL MANAGEMENT PLAN
EXECUTIVE SUMMARY, 2003

New Projects for 2003: Assume all field operations involved with the Little Kitoi Lake Evaluation.

Cost Recovery Harvests for 2003: Initiate the first cost recovery fishery since 1989.

Projected Adult Salmon Runs, Stocking Plan, and Egg Take Goals (2004 Stocking Goals), 2003:

Stocking Location (Broodstock)	2003 Projected Enhanced Run	2003 Stocking Plan	Goals		
			2003 Eggs	2004 Stocking	
Kitoi Bay pink (BKC)	8,613,388	142,000,000 [a]	185,000,000	142,000,000	F
Kitoi Bay chum (BKC)	563,158	20,000,000 [a]	25,000,000	22,000,000	F
Kitoi Bay coho (BKC)	159,867	1,060,000 [b]	1,300,000	1,000,000	S
Little Kitoi Lake coho (BKC)	500	0	0	0	
Jennifer Lake coho (BKC)	3,300	200,000 [a]	300,000	200,000	F
Ruth Lake coho (BKC)	0	30,000	60,000	30,000	F
Total coho return to Kitoi Bay area	163,667				
Crescent Lake coho (BKC)	6,600	165,000	600,000	165,000	F
Katmai Lake coho (BKC)	1,500	15,000	40,000	15,000	F
Little Kitoi Lake sockeye (SL)	7,700	300,000 [ac]	399,000	300,000	PS

Broodstocks: BKC - Big Kitoi Creek (Kitoi Bay Hatchery); SL - Saltery Lake.
Life stage: F - Fry or Fingerling; PS - Presmolt; S - Smolt

[a] Brood Year 2002

[b] Brood Year 2001

[c] Brood Year 2002 -100,000 presmolt will be stocked in the fall of year 2003 and 200,000 spring presmolt will be stocked in 2004.

Summary of active Fish Transport Permits for Kitoi Bay Hatchery:

Project Name FTP Number	Issue Date	Expiration Date	Purpose
Kitoi Bay Pink 01A-0102	9/1/01	8/30/06	Allows Big Kitoi Creek (BKC) pink salmon egg take of 215,000,000 green eggs and release of up to 182,000,000 fry into Big Kitoi Bay.
Kitoi Bay Chum 01A-0103	9/1/01	8/30/06	Allows BKC chum salmon egg take of 25,000,000 green eggs and release of up to 22,000,000 fed fry into Big Kitoi Bay.
Kitoi Bay Coho 02A-0007	5/01/02	5/01/12	Allows BKC coho salmon egg take of 1,300,000 green eggs, to be incubated and reared at KBH and the release of 1,000,000 20 g smolt into Big Kitoi Bay.
Jennifer Lake Coho 02A-0009	5/01/02	5/01/12	Allows BKC coho salmon egg take of 300,000 green eggs to be incubated and reared at KBH and the release of 250,000 fingerlings into Jennifer Lake.
Ruth Lake Coho 02A-0011	5/01/02	5/01/12	Allows BKC coho salmon egg take of 60,000 green eggs to be incubated and reared at BKH and the release of 50,000 fingerlings into Ruth Lake.
Crescent Lake Coho 02A-0008	5/01/02	5/01/12	Allows BKC coho salmon egg take of 600,000 green eggs to be incubated and reared at BKH and the release of 500,000 fingerlings into Crescent Lake.
Katmai Lake Coho 02A-0010	5/01/02	5/01/12	Allows BKC coho salmon egg take of 40,000 green eggs to be incubated and reared at BKH and the release of 30,000 presmolt into Katmai Lake.
Little Kitoi Sockeye 0068	9/1/97	12/31/08	Allows Saltery Lake (SL) egg take of 1,200,000 green eggs 97A- and transfer, incubation and rearing of up to 300,000 presmolt and 600,000 smolt at Kitoi Bay Hatchery.
Spiridon Sockeye 02A-xxxx	**2002**	**2007**	**Allows the transfer of up to 2,000,000 eyed eggs of Saltery stock from PCH to KBH if water problems occur at PCH**
Little Kitoi Sockeye 02A-0059	2003	2004	Allows transfer of 300,000 Saltery fry from PCH to KBH to allow reinforcement of pipeline supports
Little Kitoi Sockeye 02A-0060	2003	2004	Allows 100,000 Saltery fall presmolt release into LKL and 200,000 spring presmolt into netpens in LKL for imprinting and non-volitional release

Note: Bold denotes FTPs that will expire or will need changes prior to 2003 egg takes and 2004 outstockings.

ABSTRACT

The United States Department of the Interior constructed Kitoi Bay Hatchery (KBH) in 1954. The facility was destroyed in the 1964 earthquake and was rebuilt in 1965 by the Alaska Department of Fish and Game. Currently, the facility is financed and operated by the Kodiak Regional Aquaculture Association. KBH is located about 48 kilometers north of the city of Kodiak. The hatchery has the capacity to incubate approximately 215 million salmon eggs and rear up to 180 million juveniles of all life stages. Currently, KBH incubates and rears a single stock of each of the following salmon species: pink *Oncorhynchus gorbuscha*, chum *O. keta*, coho *O. kisutch,* and sockeye *O. nerka.*

Kitoi Bay Hatchery personnel plan to release 142,000,000 pink salmon fry of Kitoi Bay (Big Kitoi Creek) broodstock into Kitoi Bay in 2003. Prior releases of this broodstock are expected to produce a return, in 2003, of about 8,600,000 adult pink salmon. Egg takes this fall will require about 185,000,000 eggs for future pink salmon releases.

Approximately 20,000,000 chum salmon fry of Kitoi Bay (Big Kitoi Creek) broodstock will be released into Kitoi Bay in 2003. Prior releases of this broodstock are expected to produce a return, in 2003, of about 563,000 adult chum salmon. Egg takes this fall will require about 25,000,000 eggs for future chum salmon releases.

KBH personnel also plan to release about 1,500,000 juvenile coho salmon of Kitoi Bay (Big Kitoi Creek) broodstock into Kitoi Bay and four lakes in 2003. Prior releases of this broodstock are expected to produce a return in 2003 of about 163,000 adult coho salmon in the Kitoi area and another 8,000 returning to the Villages of Port Lions (6,600) and Ouzinkie (1,500). Egg takes this fall will require about 2,300,000 eggs for future coho salmon releases.

About 100,000 brood year (BY) 2002 Saltery Lake sockeye salmon will be released into Little Kitoi Lake (LKL) as fall presmolt in 2003. In addition, about 200,000 presmolt (BY 2002) will be reared through the winter and then transferred in the spring of 2004 to net pens located in LKL for short-term rearing, imprinting, and non-volitional release into Little Kitoi Bay. Prior releases of this stock are expected to produce a return, in 2003, of about 7,700 adult sockeye salmon. Egg takes this fall will require about 400,000 eggs for future sockeye salmon releases.

A cost recovery project will be initiated at Kitoi Bay Hatchery for the 2003 season. This is the first cost recovery project since 1989. There will be a cost recovery target of approximately $500,000. The target species will be pink salmon with a lesser component of chum and coho salmon.

INTRODUCTION

Kitoi Bay Hatchery (KBH) is located on Afognak Island (58°11.04' N lat., 152°21.04' W long.) on the west side of Izhut Bay approximately 48 kilometers north of the city of Kodiak (Figure 1). The facility was constructed in 1954 by the United States Department of the Interior, Fish and Wildlife Service, but was destroyed in the 1964 earthquake and then rebuilt by the Alaska Department of Fish and Game (ADF&G) in 1965. The hatchery was initially designed as a sockeye salmon *Oncorhynchus nerka* research facility; however, in 1976 the emphasis switched to pink salmon *O. gorbuscha* production. The present goal of the facility is to provide enhanced salmon fishing opportunities for the Kodiak common property fisheries by increasing the returns of sockeye, coho *O. kisutch*, pink, and chum *O. keta*, salmon primarily to the Kitoi Bay area (Figures 2 and 3). KBH was designed to increase salmon production for Kodiak Management Area commercial seine and set gillnet fisheries. Secondary user groups (in terms of the number of salmon harvested) to benefit from the hatchery production, include subsistence and recreational fishers. KBH has the capacity to incubate 215 million "green" salmon eggs (193 million "eyed" eggs) and rear up to 180 million juveniles of all life stages (fry, fingerling, presmolt, and smolt). Funding for the hatchery was provided exclusively by the ADF&G prior to fiscal year (FY) 87, and was provided jointly by the ADF&G and the Kodiak Regional Aquaculture Association (KRAA) from FY87-FY91. The hatchery has been fully funded by KRAA since FY92.

KBH is primarily a site-specific production facility raising four species of juvenile salmon (pink, chum, coho, and sockeye salmon). The majority of the eggs are collected and incubated on-site and resultant juveniles of all lifestages are reared and released at the hatchery. The majority of the returning adults are caught in the Duck, Izhut, and Inner and Outer Kitoi Bays Sections of the Afognak District by Kodiak's commercial salmon net fishers (Figures 2 and 3).

Big Kitoi Lake (BKL) supplies KBH with water through two 36-cm (14 inch) diameter pipelines (Figure 4). There are two deep pipelines extending 460 m and 740 m into BKL drawing water from depths of 15.4 m and 23.1 m, respectively. These two pipelines join just downstream of the dam and supply one pipeline extending to the hatchery with deep water ranging from 37.5° to 43°F (3.0° to 6.0° C.). The shallow pipeline draws water from a depth of 1.5 m, supplying the hatchery with water ranging from 33° to 63°F (0.5° to 17°C). These pipelines connect to a manifold allowing the hatchery to control water temperatures in any part of the hatchery.

Excess lake water drains from BKL through Big Kitoi Creek (BKC; Figure 4). BKC contains a barrier falls approximately 508 m upstream from salt water and 185 m downstream from BKL. The falls prevent adult salmon escapement into BKL. The mouth of BKC is adjacent to KBH. A weir is located at the mouth of the creek where pink salmon egg takes occur. Coho and chum salmon ascend a fish ladder at the weir and enter two raceways adjacent to the hatchery facility where egg takes occur.

Little Kitoi Lake (LKL) is located approximately 0.5 km north of KBH (Figure 4). LKL drains through concrete raceways and a fish pass (Alaskan Steeppass type) system located at the outlet of the lake. All returning adults must pass through this system before entering the lake. The raceways are designed to control movement of both adult salmon and smolt, enabling the single system to monitor adult escapement

and juvenile outmigration simultaneously. Smolt emigrate through the raceways into a pipeline bypass adjacent to the adult fish pass. The fish pass and outmigration pipeline drain directly into Little Kitoi estuary.

The development of a pink salmon brood source began at the hatchery in 1976 using donor stock from a small run to Big Kitoi Creek. Pink salmon are the only salmon species indigenous to Big Kitoi Creek. The program expanded from approximately five million eggs in 1976 to 215 million eggs in 1989, and remains near this level (Tables 1 and 2). Recent improvements in green-egg to eyed-egg survival has lowered the pink salmon egg take requirement to 185 million eggs (McCullough and Aro 2002; Table 2). All pink salmon eggs are collected from broodstock returning to Big Kitoi Creek and are incubated at KBH. The resultant fry are reared in saltwater net pens adjacent to the hatchery for a period of three to eight weeks prior to their release into Kitoi Bay. We propose continuing the KBH pink salmon program at full production (approximately 142 million fry release in 2004) in 2003.

A chum salmon broodstock program began in 1980 using Sturgeon River stock. Since 1986, runs to the hatchery have been adequate to collect broodstock from Big Kitoi Creek, but the hatchery production goal of 25 million eggs (a 22 million fry release) was not consistently achieved until brood years (BY) 1999-2002. An outbreak of infectious hematopoietic necrosis virus (IHNV) resulted in a complete brood year failure in 1991 (BY 1990). Ultraviolet (UV) light water disinfecting units were installed in the hatchery in 1991 to sterilize all incubation water in an effort to prevent further disease outbreaks. The UV water treatment has been successful; no outbreaks of IHNV have occurred in chum salmon since it was installed. Chum salmon fry produced at the hatchery are reared in saltwater net pens adjacent to the hatchery for a period of four to twelve weeks prior to their release into Kitoi Bay. We propose continuing the KBH chum salmon program at full production (a release of about 22 million fry in 2004) in 2003.

A coho salmon fry remote release program was started at KBH in 1982 using Buskin and Little Kitoi Lake (LKL) wild stocks. The fry were released into a number of Kodiak road system lakes and a portion were back stocked into Buskin and Little Kitoi Lakes. Coho salmon fingerlings were released into Kitoi Bay (wild LKL stock) in 1990 to develop a hatchery broodstock returning to Big Kitoi Creek and to increase the commercial harvest in the Kitoi Bay area. Since 1993, coho salmon runs have been adequate for hatchery egg takes and have provided enough eggs to reach production goals (about 2.3 million). The majority of resulting fry are reared to smolt at the hatchery; however, some juveniles are released into local lakes in the Kitoi Bay area (Jennifer and Ruth Lakes; Figure 4). In the spring, coho salmon fingerlings are also stocked into Crescent Lake (adjacent to Port Lions; Figure 5) and in the fall, presmolt are stocked into Katmai Lake (adjacent to Ouzinkie village; Figure 1). These projects have created coho salmon subsistence fisheries for the villages of Port Lions and Ouzinkie. In addition, the Katmai Lake stocking provides an educational project for local school students who assist with the stocking. We propose continuing the coho salmon fingerling, presmolt and smolt release program in 2003 at similar release levels as in 2002 (about 1.5 million combined fingerling/presmolt/smolt).

A pilot project was initiated in 1989 and continued through 1994 to develop a late-run sockeye salmon broodstock that would return to LKL. This program was designed to utilize an age 0. component of the late-run Upper Station Lake sockeye salmon stock. This project was intended to develop a brood source at LKL to provide sockeye salmon eggs for incubation and short-term fry rearing at Pillar Creek Hatchery

with resultant fry stocked into Spiridon Lake. The project was modified in 1993 to produce presmolt and smolt due to unsatisfactory survival from the age 0. releases. Adult returns to LKL from these releases have not been adequate to supply PCH with eggs or to increase releases at KBH for broodstock development.

Research by ADF&G and the U.S. Fish and Wildlife Service (FWS) concluded that Saltery Lake sockeye salmon, as opposed to late-run Upper Station sockeye salmon, is preferred for Spiridon Lake and LKL stocking (Clevenger et al. 1997; Honnold 1997). The run timing of Saltery Lake sockeye salmon is earlier than the late-run Upper Station stock, and the use of Saltery Lake stock should increase broodstock available because the Saltery stock should return after the peak of the chum salmon fishery and before the pink and coho salmon runs (Figure 6). This run timing is expected to improve the sockeye salmon escapement into LKL. We identify production requirements in this plan using Saltery Lake sockeye salmon as the sockeye salmon stock for broodstock development.

The Saltery Lake sockeye salmon stock releases into LKL began with a release of smolt in the spring of 1999 (BY 97). Low numbers of spring outmigrants from LKL led to an experiment where half of the BY 98 sockeye salmon were released in the fall of 1999 and the other half in the spring of 2000. These releases were differentially fin clipped to determine their survival rates and emigration timing. Results from the fin clipping studies indicated that the most successful releases, in terms of the number of smolt produced, occurred from the fall stocking. Fall outstockings have continued since 1999 (BY 99-BY 01) and have appeared to reduce the incidence of smolt holding in LKL an extra year. The number of outmigrants has continued to be lower than expected and is likely the result of inadequate zooplankton to support the levels of outstocking into LKL (Schrof and Honnold *in press*).

The combination of low numbers of outmigrants and poor zooplankton levels in LKL will require a modification to the rearing and release strategy for this broodstock development project beginning in 2003. The 300,000 BY 02 Saltery Lake sockeye salmon will be released into two different groups. The first group of approximately 100,000 fall presmolt will be released into LKL in the same manner as BY 99-BY 01. The remaining 200,000 juvenile sockeye salmon will be reared at KBH until April or May, when they will be transferred into netpens in LKL for short-term rearing and imprinting. The smolt will then be non-volitionally released during the peak outmigration period of the resident Saltery Lake sockeye salmon stock. This rearing and release strategy is intended to produce approximately 250,000 sockeye salmon smolt, which should provide adequate numbers of returning adults (about 35,000; Tables 1 and 2) to satisfy the projects original broodstock development goal.

Water samples collected from the hypolimnion of LKL in 1990 were found to contain substantial concentrations of hydrogen sulfide (Schrof et al. 2000). We suspect that saltwater entered LKL during the 1964 earthquake and, over the following years, hydrogen sulfide developed within the three basins at the bottom of lake. The hydrogen sulfide layer created a nutrient "sink," which hindered the productivity of the lake and resulted in very low zooplankton abundance and biomass. Therefore, in 1995, a pipeline was sunk into the lake and most of the hydrogen sulfide was siphoned off into Kitoi Bay. Although a small amount of hydrogen sulfide remains, the zooplankton levels immediately showed signs of improvement. LKL was fertilized in 2000-2001 and increased zooplankton levels have been observed each consecutive year. Although budget constraints have discontinued the fertilization program, limnological data will continue

to be collected and analyzed annually to monitor hydrogen sulfide levels and zooplankton abundance and biomass levels. Zooplankton biomass concentrations will continue to be used to determine stocking levels.

We propose to continue the Saltery Lake sockeye salmon egg take as part of LKL broodstock development until sufficient adults return to LKL. The number of adults necessary to satisfy the broodstock goal will vary each year depending on the stocking goal for Spiridon Lake. For example, about 2,500 broodstock will be required in 2003, including 250 adults for continued stocking at LKL. Previous years egg takes, however, have required over 4,000 broodstock (Honnold and Clevenger *in press*). The Saltery Lake egg take will be conducted by Pillar Creek Hatchery staff.

The egg take season at KBH occurs from early July through the middle of November (Figure 6). The chum salmon egg takes, with a goal of 25 million eggs, start in early July and run through early August. The pink salmon egg takes, with a goal of 185 million eggs, start in early September and run through the third week of September. The season ends with the coho salmon egg takes, which occur from late October through the middle of November. The coho salmon egg take goal is about 2.3 million eggs. A LKL sockeye salmon egg take will not occur unless sufficient numbers of returning adults make it feasible. Although broodstock requirements for 2003 are only about 2,500 adults (Table 3), it is often difficult to seine brood fish in LKL. Thus, it will require an escapement of about 6,000 to 7,000 sockeye salmon to meet broodstock goals in 2003. The run is expected to be about 7,000 (100% Saltery Lake stock) sockeye salmon in 2003 (Table 3). Adults returning will be enumerated as they enter LKL. The LKL sockeye salmon egg take should occur from mid to late September if there is adequate escapement numbers.

In 2003 or 2004, due to work planned on the Pillar Creek Hatchery water reservoir, it may be necessary to transfer up to two million eyed Saltery Lake sockeye salmon eggs to KBH (McCullough and Clevenger 2002; Honnold and Clevenger *in press*). These eggs would be incubated and the resulting fish reared at KBH for release into Spiridon Lake.

This management plan will continue to evolve until all program objectives are reached. Inseason assessments and project approvals by the KRAA, ADF&G, or FWS may result in changes to this document in order to reach or maintain program objectives.

2002 BROOD YEAR: RELEASES IN 2003 AND 2004

Table 1 describes 2002 egg takes, planned releases in 2003 and 2004, projected returns in 2004-2008, and the status of Fish Transport Permits (FTP). Appendix A describes survival estimates used to project production. Appendices B - F list KBH historical releases for pink, chum, coho, and sockeye salmon, respectively.

Pink Salmon: Kitoi Bay Hatchery (Big Kitoi Creek) Stock

In 2003 we plan to rear and release 142 million 0.75-g pink salmon fry directly into Kitoi Bay (Table 1; Figures 3 and 4). The fry are volitionally released from the hatchery via pipelines into saltwater net pens and reared in saltwater for a period of three to eight weeks and then released into Kitoi Bay. Actual stocking levels are determined by electronic counters, which all fry pass through before entering saltwater net pens.

About 7,100,000 adult pink salmon are expected to return to KBH in 2004 from this release (Table 1). Based on historical harvest timing, the pink salmon run should begin in late July, peak in early August and end in late August (Figure 7). Most pink salmon returning to KBH will be harvested in the commercial salmon fishery in Izhut, Duck, and Kitoi Bays Sections (Figure 3).

Chum Salmon: Kitoi Bay Hatchery (Big Kitoi Creek) Stock

In 2003 we plan to rear and release 20 million 1.75-g chum salmon fry directly into Kitoi Bay (Table 1; Figures 3 and 4). The fry are volitionally released from the hatchery via pipelines into saltwater net pens and reared in saltwater for a period of 4 to 12 weeks. Actual stocking numbers are determined by electronic fry counters, which all fry pass through before entering saltwater net pens.

Approximately 400,000 adults are expected to return from the 2003 release beginning in 2005 and continuing through 2008. The historic age composition of chum returning to Kitoi is 15.7% 0.2, 68.7% 0.3, 15.5% 0.4 and 0.1% 0.5 age salmon. We will continue with the collection of chum salmon harvest data (scales) throughout the run in 2003 to develop a more complete and representative age class record. Based on historical harvest timing, chum salmon runs into Kitoi Bay usually begin in early June, peak in mid June to early July and end in early August (Figure 7). Most chum salmon returning to KBH will be harvested in the commercial salmon fishery in the Duck, Izhut, and Kitoi Bays Sections (Figure 3).

Coho Salmon: Kitoi Bay Hatchery (Big Kitoi Creek) Stock

Many of the juvenile coho salmon produced from BY 02 egg takes will be stocked at remote lake locations in 2003; however, the largest release of juvenile coho salmon in 2003 will be smolt produced from the BY 01 egg take (Table 1). About 1,060,000 18.0-g age 1. coho salmon smolt (Big Kitoi Creek brood source) will be directly released into Kitoi Bay (Figures 3 and 4). Initial imprinting occurs prior to transfer into saltwater, while smolt are still in the hatchery freshwater raceways. The smolt are transferred from the hatchery via pipelines into saltwater net pens and reared for about four weeks to provide additional time for imprinting and osmoregulation. The saltwater net pens are located in the vicinity of the Big Kitoi Creek discharge (KBH water source), which is intended to provide separation from the pink and chum fry and provide a freshwater lens to help facilitate osmoregulation. The average survival from smolt released to adult return to Big Kitoi over the last five years has been 15.2% (Appendix A). We expect the 2003 smolt release to produce approximately 159,000 adults returning in 2004 as age 1.1 coho salmon (Table 1).

Similarly to the BY 01 egg take, coho salmon eggs were collected in BY 02 to produce smolt for release at KBH in 2004 (Table 1). We expect to release 1,000,000 coho smolt (20.0 g) in 2004, which should produce about 150,000 adults returning in 2005.

Remote lake releases, as previously mentioned, include 200,000 0.75-g coho fingerlings (BY 02 Big Kitoi Creek brood source) into Jennifer Lake in 2003 (Table 1; Figure 4). Jennifer Lake is a barren lake with a natural fish barrier near tide water. About 4,000 adults are expected to return in 2005 from this release (Table 1). Also, about 30,000 0.75-g coho fingerlings (BY 02 BKC stock) will be released into Ruth Lake in 2003, which should produce about 600 adults returning in 2005. Ruth Lake also has a natural fish barrier, preventing adults returning to access the lake. Stocking plans for both Jennifer and Ruth Lakes are based on the zooplankton levels observed from limnological sampling.

Coho salmon runs into Kitoi Bay, based on historical harvest timing, usually begin in mid July, peak in mid to late August and end in the middle of September (Figure 7). Most coho salmon returning to KBH should be harvested in the commercial salmon fishery in the Duck, Izhut, and Kitoi Bays Sections (Figure 3).

In 2003, we also plan to release 165,000 0.75-g coho salmon fingerlings into Crescent Lake (Port Lions village area; Figure 5) and 15,000 7.0-g coho presmolt into Katmai Lake (Ouzinkie village, Figure 1; Table 1). Crescent Lake stocking levels were estimated by limnological analysis. Katmai Lake stocking levels were estimated by modeling the surface area of the lake (limnology samples are not collected). The Katmai Lake release of presmolt in October is expected to minimize impacts to the lakes' forage base. Remote releases into Crescent and Katmai Lakes have occurred annually since 1987. Adult returns (BY 02) are projected to be 3,300 to Crescent Lake and 1,500 to Katmai Lake in 2005 (Table 1). The residents of each neighboring village primarily harvest these salmon during sport and subsistence fisheries. A portion of the Crescent Lake run may be available for commercial harvest in the Northwest Kodiak District (Figure 2) and the Crescent Lake Terminal Harvest Area (Figure 5; 5 AAC 18.364).

All juvenile coho salmon stocked into lakes are transported to each site by floatplane using transfer tanks. The Katmai Lake transfer also requires loading two four-wheelers equipped with small transfer tanks for a short run up to the lake.

Sockeye Salmon: Saltery Lake Stock

KBH is currently rearing 300,000 juvenile sockeye salmon from BY 02 (Saltery Lake brood source). We plan to release 100,000 11.0-g sockeye salmon presmolt into Little Kitoi Lake in October 2003 (Table 1). The remaining 200,000 presmolt will be reared through the winter at KBH, stocked into net pens in LKL in late April, early May 2004 for imprinting, and then, after testing for osmoregulation, non-volitionally released into Little Kitoi Bay. The non-volitional release will coincide with the outmigration of the lake-rearing juveniles that were stocked in the fall of 2003. The presmolt will be transported to LKL in a transfer tank installed on a barge and then hauled up the LKL fish pass by bucket and released directly into LKL (fall presmolt) or into net pens (spring presmolt). A portion of the 100,000 fall presmolt release will be differentially fin clipped to determine age during outmigration. Baseline scale samples will be collected

from each release group prior to transfer and from LKL resident and non-volitional net pen groups prior to release.

BY 02 sockeye salmon releases are expected to produce approximately 35,000 adults returning to LKL from 2005 to 2008, with the majority returning 2006 and 2007 (Table 1). The returning adults are expected to have similar run timing as Saltery Lake sockeye salmon with the initial run beginning in late June, peaking in early to mid July and ending in mid to late August (Figure 8; Honnold 1997). The run timing is earlier than late-run Upper Station sockeye salmon stock, which should make broodstock collection easier since the Saltery Lake stock should return after the chum salmon fishery and prior to most of the pink salmon (Figure 7). This return timing is expected to reduce their harvest in the common property fishery and increase escapement into LKL.

In summary, we propose releasing the following juveniles in 2003: 142 million pink salmon fed fry, 20 million chum salmon fed fry, 1,060,000 coho salmon smolt, 445,000 coho salmon fingerlings, 15,000 coho salmon presmolt, and 100,000 sockeye salmon presmolt (Table 1). In addition, we propose releasing 1,000,000 coho salmon smolt and 200,000 sockeye salmon spring presmolt in 2004 from our BY 02 egg take.

2003 ESCAPEMENT GOALS AND BROODSTOCK REQUIREMENTS

KBH escapement goals for all species are described in Table 3. Adult pink, chum, and coho salmon returning to Kitoi Bay were imprinted on Big Kitoi Creek (hatchery water supply; Figure 4). Only pink salmon are indigenous to Big Kitoi Creek. All returning salmon are initially prevented access to Big Kitoi Creek by a weir and a barrier falls that prevents the fish from entering Big Kitoi Lake. Pink and chum salmon are allowed to enter the creek and spawn to propagate the run in the event of the loss of the hatchery-reared fish. Pink and chum salmon eggs collected from salmon returning to Big Kitoi Creek/KBH in 2003 will provide for a fry release into Kitoi Bay in 2004. Coho salmon eggs collected from KBH in 2003 will provide juvenile fish for release at Crescent, Katmai, Jennifer, and Ruth Lakes in 2004 and Kitoi Bay in 2005. Pink and chum salmon escapements include the number of salmon remaining in the creek after KBH has finished its egg takes. Little Kitoi Lake (LKL) sockeye salmon escapement in 2003 will be monitored at the adult compound to determine whether or not an egg take at LKL is feasible.

Saltery Lake sockeye salmon replaced Upper Station as the late-run brood source in 1997 for enhancement and broodstock development. About 2,200 Saltery Lake sockeye salmon will be necessary in 2003 for PCH broodstock to continue the Spiridon Lake project (Honnold and Clevenger *in press*). KBH will need approximately 250 adults for the LKL broodstock development program. All egg takes will follow the criteria established in the Pillar Creek Hatchery Annual Management Plan (Honnold and Clevenger *in press*).

2003 BROOD YEAR: RELEASES IN 2004 AND 2005

Table 2 describes 2003 egg takes, planned releases in 2004-2005, projected returns for 2005-2009, and the status of Fish Transport Permits. Appendix A describes survival estimates used to project adult production.

Pink Salmon: Kitoi Bay Hatchery (Big Kitoi Creek) Stock

We propose releasing 142 million 0.65-g pink salmon fry into Kitoi Bay in 2004 (Table 2). At this time, a pink salmon release of this magnitude would be at KBH's maximum capacity. The actual number may be higher depending on how many chum salmon eggs are collected and the egg to fry survival of both species (Appendix A). Pink and chum salmon production is limited by the hatchery eyed-egg incubation space (ADF&G hatchery operating permits are based on green-eggs). The total pink and chum salmon incubation space is about 190 million eyed-eggs. The chum salmon run, associated broodstock collection and egg take occurs prior to the pink salmon run and broodstock collection (Figures 6 and 7). If the maximum chum salmon egg take occurs and results in about 25 million green eggs, incubation space will not be available for a maximum pink salmon egg take. If the chum salmon egg take results in less than 25 million eyed-eggs, additional incubation space will be available for the pink salmon egg take up to the permitted maximum of 215 million green-eggs (resulting in about 190 million eyed-eggs).

Approximately 7.1 million adult pink salmon are expected to return to KBH in 2005 (Table 2). Based on historical harvest timing, the pink salmon run is expected to begin in late July, peak in early August and end in mid to late August (Figures 6 and 7).

Chum Salmon: Kitoi Bay Hatchery (Big Kitoi Creek) Stock

We also propose releasing 22 million 1.75-g chum salmon fry into Kitoi Bay in 2004 (Table 2). The actual number released will depend on the number of eggs collected and the egg to fry survival (Appendix A). If KBH's maximum chum salmon egg capacity is achieved (25 million), about 22 million chum salmon fry should be produced.

The 2004 releases should produce about 440,000 adult chum salmon returning from 2006-2009 (Table 2). The majority of the return is expected in 2007 as age 0.3 chum salmon. Based on historical harvest timing, the chum salmon run is expected to begin in early June, peak in mid June to early July and end in early August (Figure 7).

Coho Salmon: Kitoi Bay Hatchery (Big Kitoi Creek) Stock

We expect to release 1,000,000 coho smolt (20.0 g) in 2004 (from the BY 02 egg take), which should produce about 150,000 adults returning in 2005 (Table 2).

We also intend to release about 1,310,000 juvenile coho salmon of brood year 2003 Big Kitoi Creek brood stock (fingerlings and presmolt in 2004 and smolt in 2005) in 2004-2005 (Table 2). The releases will occur in Kitoi Bay and four freshwater lakes.

We also propose releasing 200,000 0.75-g coho fingerlings (BY 03) into Jennifer Lake and 30,000 0.75-g coho fingerlings into Ruth Lake in 2004 (Table 2; Figure 4). The fingerlings will be transported from the hatchery to the lakes by float plane and transfer tank. Both lakes are located in the Kitoi Bay area and are barren with natural barrier falls. The actual stocking levels will be determined by limnological analysis.

We also plan to release 165,000 0.75-g coho salmon fingerlings into Crescent Lake (Village of Port Lions; Table 2; Figure 5) and 15,000 7.0-g coho presmolt into Katmai Lakes in 2004 (Village of Ouzinkie; Figure 1).

The release in Kitoi Bay in 2005 will consist of 900,000 20.0-g age 1. smolt (BY 03; Table 2). This number is 100,000 smolt smaller than the permitted level and is a result of the change in the sockeye salmon rearing strategy, which will require additional raceway space throughout the year that was previously used for coho salmon rearing. The smolt will be reared and released in a manner similar to the 2003 coho smolt release.

About 9,400 adult coho salmon are expected to return in 2006 from fingerlings (Jennifer, Ruth, and Crescent Lakes) and presmolt (Katmai Lake) stocked in 2004 (Table 2). An additional 135,000 adults should return in 2006 from the smolt releases (Kitoi Bay) in 2005. Of the 141,000 adult coho salmon returning in 2006 to the Kitoi Bay area (144,000 total returns minus 3,300 returning to Crescent Lake), about 135,000 will be available for harvest (Izhut, Duck, and Kitoi Bays Sections; Figure 3). The remaining 6,000 coho salmon will be needed for broodstock, due to sea lion predation and other mortality factors. Adult returns are projected to be 3,300 to Crescent and 1,500 to Katmai Lake in 2006 and will primarily be harvested in sport and subsistence fisheries by the residents of each neighboring village. Based on historical harvest timing, these coho salmon runs should begin in mid July, peak in mid to late August and end in early September (Figure 7).

Sockeye Salmon: Saltery Lake Stock

Lastly, we propose releasing 300,000 BY 03 sockeye salmon (Saltery Lake stock) presmolt in 2004 and 2005 into LKL in a manner similar to the 2003 and 2004 releases (BY 02; Table 2). The actual number released will be determined after annual limnological analysis of the lake. About 35,000 adults are expected to return predominantly in 2007 and 2008 from this release. The returning adults are expected to have similar run timing as Saltery Lake sockeye salmon with the initial run beginning in late June, peaking in early to mid July and ending in mid to late August (Figure 8; Honnold 1997).

In summary, we expect the following releases and production from BY 2003 egg takes: 142 million pink salmon fry producing 7.1 million adults, 22 million chum salmon fry producing 440,000 adults, 900,000 coho salmon smolt producing 135,000 adults, 410,000 coho fingerlings and presmolt producing 9,400 adults, and 300,000 sockeye salmon presmolt producing 35,000 adults (Table 2).

SALMON HARVEST MANAGEMENT

The forecasted adult runs and potential harvests in 2003 as a result of prior KBH juvenile salmon releases are presented in Table 3.

General Conditions of Harvest Management, 2003

The primary objective of the KBH is to provide salmon for common property fisheries. It is recognized that a joint effort between the ADF&G and KRAA is necessary to continue the operation of the hatchery at full production levels. The Kodiak Area Management Biologist manages all salmon fisheries. The fisheries in Kitoi, Izhut, and Duck Bays will be cooperatively managed by the Kitoi Bay Hatchery Manager and the Kodiak Area Management Biologist to ensure adequate broodstock collection and orderly common property and cost recovery fisheries. Operation of the hatchery will maintain the genetic diversity of all broodstocks and allow future harvest in the common property and cost recovery fisheries.

Special Harvest Area Description, Conditions, and Harvest Strategies: KBH

The Kitoi Bay SHA is defined as the Inner Kitoi Bay Section (Brennan et al. 2003; Figures 3 and 4). The Outer Kitoi Bay Section will also be designated as a SHA by Emergency Order (EO) in 2003 in order to facilitate cost recovery (K. Brennan, Alaska Department of Fish and Game, Kodiak, personal communication). A combination of funds received from the 1989 cost recovery fishery (Kitoi Fund) and the cost recovery fishery to be conducted during the 2003 harvest season will be used to operate the hatchery in FY 04. All efforts will be made to minimize commercial fishery closures during the cost recovery fishery. However, there may be additional closures, occurring more frequently in the Inner and Outer Kitoi Bay Harvest sections, to ensure that the cost recovery goal is achieved. Common property fisheries will harvest all excess salmon over broodstock and cost recovery needs. Harvest information will be monitored through the ADF&G fish ticket information collected from each buyer and will be cross-referenced with any cost recovery sale. Due to the KBH location, the incidental catch of non-targeted salmon in the Kitoi Bay area should be insignificant.

Harvest of Returns to Kitoi Bay Hatchery

The Kitoi Bay harvest strategy is described in the Eastside Afognak Management Plan (5 AAC 18.365). The harvest strategy is designed to increase fishing opportunities for the commercial salmon net fishery in the Duck, Izhut, and Kitoi Bays Sections (Figure 3) while providing for adequate broodstock escapement to KBH and a cost recovery fishery in 2003. Most of the salmon returning to KBH are harvested in these sections. It is recognized that a joint effort between the ADF&G and the KRAA is necessary to continue operation of the hatchery at full production levels. Inseason management of KBH salmon runs is complicated because of overlapping run timing between species and the escapement priority given to broodstock and the cost recovery fishery (Figures 6-8).

Broodstock collection schedules will maintain the genetic diversity of returning salmon at KBH and allow future harvest in the common property fishery. During the broodstock collection periods, the burden of achieving adequate broodstock escapement while maintaining high quality harvests on hatchery bound returns will be shared by the Kitoi Bay Hatchery Manager and the Kodiak Area Management Biologist.

Cost recovery fisheries occurred in the Kitoi Bay SHA in 1987, 1988, and 1989 and will resume in 2003. The Board of Directors of KRAA has determined that cost recovery is required to extend the life of the Kitoi Fund, which had sustained the operations at Kitoi Bay since 1989. A annual cost recovery goal has been set at approximately $500,000, which would extend the life of the Kitoi Fund for a period of approximately 10 years (L. Malloy, Kodiak Regional Aquaculture Association, Kodiak, personal communication). A Cost Recovery Committee was established and has been working with the KRAA Executive Committee to draft a cost recovery operational plan for 2003. The cost recovery harvest in 2003 will focus on pink salmon, due to the projected large run of 8.6 million fish and for other logistical reasons (L. Malloy, Kodiak Regional Aquaculture Association, Kodiak, personal communication). There will be a smaller component of chum and coho salmon harvested and sold in the cost recovery fishery as the returning adults have overlapping run timing.

Pink Salmon

Pink salmon produced at KBH are primarily harvested in commercial purse and beach seine fisheries in the Duck, Izhut, and Kitoi Bays Sections (Figures 3 and 4). Set gillnet fishers also benefit as a result of the relocation of a segment of the purse seine fleet to target KBH salmon. Natural stocks of pink salmon destined for the Westside of Kodiak Island and other Afognak Island systems may also contribute to the harvest.

The Kitoi Bay area is managed under the guidelines in the Eastside Afognak Management Plan (5 AAC 18.365). Depending on run strength (the forecasted 2003 run is about 8,600,000 pink salmon; Table 3), there will be an opening in late July to harvest excess males, which arrive during the early portion of the run. In order to harvest pink salmon in excess of the hatchery broodstock needs (350,000; Table 3), additional openings in this area may occur. It is an egg take objective that the brood fish sex ratio be at least 60% female and for the egg takes to occur over a three-week period, to ensure the stock's genetic diversity.
Depending on run strength and timing, the Inner and Outer Kitoi, Izhut, and Duck Bay Sections may close to commercial salmon fishing from July 20 through September 5 to allow for pink salmon broodstock

escapement and cost recovery (Figures 3 and 7). Most pink salmon broodstock is collected in mid August. Once the pink salmon broodstock is collected and contained behind the barrier net enclosure (Figure 4), additional commercial fishing time may be allowed in the inner and outer Kitoi Bay Sections depending on the progress of the cost recovery fishery. Fishing periods will be coordinated between the Kitoi Bay Hatchery Manager and the Kodiak Area Management Biologist to ensure adequate broodstock collection while maintaining an orderly cost recovery and commercial fishery. Big Kitoi Creek pink salmon escapement will be monitored at a weir. Escapement goals have not been formally established for Big Kitoi Creek; however, about 15,000 pink salmon annually spawn in the creek (Table 3).

Chum Salmon

Chum salmon produced at KBH are taken in commercial purse seine fisheries in the Izhut, Duck, and Kitoi Bays Sections (Figure 3). In 2003 chum salmon returns to Kitoi Bay are projected at about 563,000 total adults (Table 3). This is a considerable increase from historic adult returns and marks the beginning of fish returning from larger fry releases which began in 2000 (BY 99). The chum salmon broodstock requirement for KBH is 30,000 fish (Table 3); therefore, a commercial fishery targeting chum salmon is expected in the Izhut, Duck, and Kitoi Bays Sections in 2003. Although the cost recovery fishery will be focusing on pink salmon there may be some late returning chum salmon harvested in the cost recovery fishery.

Most of the chum salmon needed for broodstock are expected to be present in the Inner Kitoi Bay Section by the first week in July (Figures 3 and 4). The chum salmon egg take is expected to occur from early July through early August. In 2001 a volunteer seine boat was utilized to help corral broodstock toward the entrance of the brood holding area. This herding technique was successful and, with continued volunteer support, the technique may be used again in 2003 to improve chum salmon broodstock collection at KBH.

Chum salmon commercial openings in the Duck, Izhut, and Kitoi Bays Sections typically occur on 9 June, but are scheduled to begin 5 June in 2003 (Brennan et al. 2003). In order to harvest adults in excess to hatchery broodstock needs, additional openings in these sections may occur as run strength is determined. The Kitoi Bay area will be managed under the guidelines in the Eastside Afognak Management Plan (5 AAC 18.365). The major harvest areas are Duck, Izhut, and Kitoi Bays Sections (Figure 3). Brood fish are retained by a barrier net enclosure in the Kitoi Bay estuary (Figure 4). Once all chum salmon broodstock are contained behind the barrier net, additional commercial fishing time may occur inside Kitoi Bay. Big Kitoi Creek chum salmon escapement will be monitored at a weir. Escapement goals have not been formally established for Big Kitoi Creek; however, each year, on average, about 2,000 chum salmon in excess of broodstock needs have escaped into the creek (Table 3).

Coho Salmon

Coho salmon produced at KBH are harvested in commercial purse and beach seine fisheries and contribute to the catch in the Duck, Izhut, and Kitoi Bays Sections (Figure 3). About 6,000 coho salmon are required for broodstock and the lower range of the coho salmon escapement goal for Little Kitoi Lake (LKL) is 500 fish (Table 3). The adult run to KBH is forecast to be about 160,000 coho salmon; therefore, a commercial fishery targeting excess coho salmon is expected in the Kitoi Bay area in 2003. In

addition, there may be some coho salmon caught in the cost recovery fishery due to the overlap in run timing with the pink salmon return.

The majority of the coho salmon will be harvested incidental to the pink salmon fishery in the Kitoi area as well as in directed coho salmon fisheries in late August and early September. The Kitoi Bay area will be managed under the guidelines in the Eastside Afognak Management Plan (5 AAC 18.365). Hatchery broodstock will be collected throughout the coho salmon run. In the past, a specific commercial fishing closure has not been necessary to ensure adequate broodstock. The run strength in 2003 is estimated to be substantially larger than broodstock requirements; therefore, specific commercial fishing closures are not expected to occur. Once all coho salmon broodstock are collected and contained behind the barrier net, an increase in commercial fishing time may occur inside Kitoi Bay.

A regulation intended to improve broodstock collection efforts near the hatchery describes three distinct areas where fishing is either prohibited year-round or restricted between August 15 and September 30 (Figures 3 and 4; 5 AAC 18.350; 5 AAC 64.022(b)). These closed waters areas are intended to provide for orderly broodstock collections and as a precautionary measure to resolve potential conflicts between hatchery broodstock needs and subsistence and recreational fisheries. Brood fish are retained by a barrier net enclosure in the Kitoi Bay Estuary (Figure 4). In most years a substantial number of coho salmon broodstock are lost to marine mammal and bear predation (McCullough and Aro 2001).

Harvest of Late-Run Sockeye Salmon Returns to Little Kitoi Lake

The sockeye salmon broodstock development program at LKL has evolved over the years using a mixture of stocks with different run timing. In 2003, we expect all late-run sockeye salmon returns to LKL to be from the Saltery Lake stock (Table 3). The LKL broodstock development program is intended to establish an adult run of Saltery Lake stock returning to LKL of sufficient magnitude to provide for broodstock collection. The majority of the eggs collected from the broodstock will be incubated at Pillar Creek Hatchery and resultant juvenile sockeye salmon will be stocked into Spiridon Lake. A small number of eggs collected from the LKL broodstock will be incubated at KBH and resultant juveniles will be stocked into LKL to continue the broodstock development program. In 2003, returning sockeye salmon will be allowed to enter LKL and an egg take will occur if sufficient numbers of adults are available.

Some portion of sockeye salmon bound for LKL will likely be harvested incidentally during the chum and pink salmon commercial fisheries. Closures in the inner and outer Kitoi Bay Sections may occur to minimize the harvest of sockeye salmon bound for LKL. A determination will be made by the middle of August as to whether or not an egg take will be conducted at LKL. Eggs for continuing broodstock development at LKL and for continuing the Spiridon Lake stocking project will be collected from the Saltery Lake sockeye salmon stock by Pillar Creek Hatchery personnel if the LKL egg take does not occur or if egg take goals are not met.

Harvest of Coho Salmon Returns to Jennifer, Ruth, and Little Kitoi Lakes

The purpose of the Jennifer and Ruth Lakes coho salmon stocking projects is to provide enhanced coho salmon for harvest as they return to the Kitoi Bay area (Figure 3). The Kitoi Bay area harvest strategy also protects Big Kitoi Creek escapement (brood source for the stocking of these lakes; Figure 4). Coho salmon returning to Jennifer and Ruth Lakes will be harvested during commercial fisheries in Duck, Izhut, and Kitoi Bays Sections (Figure 3). All of the coho salmon bound for these lakes will be available for harvest; brood fish are not required at Jennifer or Ruth Lakes (Table 3). Jennifer and Ruth Lakes have barrier falls that prevent salmon escapement into the lakes. Fish that are not harvested at Jennifer and Ruth Lakes have access to the lower portion of the outlet streams so they are not expected to stray.

Coho salmon will be able to enter LKL beginning the first week of September to provide escapement (range of 500-1,000 salmon) and to prevent straying. Although the coho salmon peak run timing is slightly later than the pink salmon peak, most of the coho will be harvested during fisheries targeting pink salmon (Figure 7). Ruth Lake was not stocked with coho salmon in 2001; thus, adults are not expected to return in 2003. Approximately 3,300 coho salmon are expected to return in 2003 as a result of releases into Jennifer Lakes (Table 3).

Harvest of Coho Salmon Returns to Crescent Lake

The purpose of the Crescent Lake coho salmon stocking project is to provide enhanced coho salmon for harvest as they return to Crescent Lake (Figure 5; 5 AAC 18.364). Most of the 2003 coho salmon run will be harvested in the local sport and subsistence fishery; however, a portion of the run may be available for commercial harvest. The commercial harvest of Crescent Lake coho salmon is expected to occur during normal fishing periods targeting coho salmon in the Northwest Kodiak District (Figure 2). Special openings are not expected to occur within the Settler Cove Terminal Harvest Area (Figure 5). Crescent Lake does not require brood fish, escapement, or cost recovery, so all returning coho salmon will be available for harvest. Natural barriers prevent salmon access to the lake; however, fish that congregate in the outlet stream are prevented from straying since the villagers of Port Lions utilize the entire escapement for subsistence purposes. Harvest information will be monitored through subsistence permits issued to each fisher and commercial fish ticket data.

Harvest of Coho Salmon Returns to Katmai Lake

The purpose of the Katmai Lake coho salmon stocking project is to provide adult returns for sport and subsistence harvest primarily by Ouzinkie Village residents (Figure 1). This project is also intended to provide students in the Ouzinkie Village with a community and educational project assisting in the release of the presmolt. Most coho salmon returning to Katmai Lake will be harvested in the local sport and subsistence fishery. Some may also be harvested in commercial fisheries in the Northwest Kodiak District (Figure 2). All returning coho salmon will be available for harvest; brood fish are not required. This is a barriered system, which prevents escapement into the lake; fish do not stray since the village residents

harvest the entire escapement. Harvest data will be monitored through subsistence permits and commercial fish ticket data. The 2003 run is expected to be about 1,500 coho salmon (Table 3).

ADDITIONAL MEASURES FOR WILDSTOCK PROTECTION

Unplanned Cost Recovery

The following text is from the Pillar Creek Hatchery Annual Management Plan, 2003 (Honnold and Clevenger *in press*). The concept of unplanned cost recovery as described in the attached text will also apply for the Kitoi Bay SHA in the event commercial fishing activity does not occur for some reason in 2003 (Appendix G).

At this time, the PCH does not require Special Harvest Areas (SHA) for cost recovery harvests. There may be situations that arise that will require cost recovery of salmon from the enhancement projects (economic, broodstock, environmental disasters, or price dispute considerations).

In 2002, large numbers of early-run sockeye salmon returned to the Foul Bay, Waterfall Bay, and Malina Creek THAs as a result of a lack of commercial fishing activity due to price disputes. The scheduled opening was on June 9, but fishing did not commence until June 16. The 2002 Pillar Creek Hatchery Management Plan stated that ***"if large numbers of salmon return to enhancement sites prior to 9 June or if commercial fishing activities do not occur with in 48 hours of the initial fishery opening, the Kodiak Management Biologist and the KRAA will implement a harvest strategy to reduce the risk of straying salmon. The harvest strategy will include the removal of barrier nets or weirs to allow the enhanced salmon free access to freshwater. When fishing activity commences the barrier net or weir will be re-installed. The KRAA will help administer any special harvest operations in a similar manner as was implemented for the Kitoi Bay special cost recovery project in 1989. In that instance, as many fish as possible were harvested in as short a period as feasible to maintain an orderly fishery."*** The preceding plan was delayed due to KRAA and fishers concerns about the 48-hour deadline. The ADF&G reviewed the historical run timing (Figure 16) of the Afognak Lake (broodstock for Hidden and Waterfall Lakes stocking) stock and determined that the removal of the barrier net and weir could be delayed until a specific harvest plan was ready to be implemented without increasing the risk of straying. However, since 50% for the Afognak Lake sockeye salmon run typically return by 15 June, the ADF&G recommended that the barriers be removed no later than 15 June if fish are still returning and no later than 20 June if the runs decline. The fishery dispute was settled and fishing commenced on 16 June, alleviating the need to remove the barriers or conduct a special fishery.

The KRAA has drafted a unplanned cost recovery operational plan (UCROP) for cost recovery fisheries in the THAs in 2003 in the event similar situations arise as occurred in 2002 (Appendix G). The UCROP proposes that the THAs previously described be designated by EO as SHAs in 2003 if needed (L. Malloy, Kodiak Regional Aquaculture Association, Kodiak, personal communication).

The KRAA-funded ADF&G crews will be located at any cost recovery site to monitor and document the fisheries.

Genetics Policy

The ADF&G genetics policy as described in the 2001 Kitoi Bay Hatchery AMP (McCullough and Aro 2001) will be followed in 2003 for all projects.

Policies and Guidelines for Health and Disease Control

The State of Alaska Pathology Review Committee policy (McGee 1995) as described in the 2001 Kitoi Bay Hatchery AMP (McCullough and Aro 2001) will be followed in 2003 for all projects.

EVALUATION

Sockeye Salmon

The sockeye salmon evaluation program will focus on assessing production from LKL presmolt releases. As of FY 03, the evaluation plan and all the field operations have been taken over by Kodiak Regional Aquaculture Association personnel. The specifics of the evaluation plan are detailed in the Kitoi Evaluation Project Operational Plan, 2003 (R. Baer, Alaska Department of Fish and Game, Kodiak, personal communication).

Chum, Coho, and Pink Salmon

A total of 600 adult chum salmon from Big Kitoi Creek and an additional 600 from the Kitoi area commercial fisheries will be sampled for age and length data in 2003. These data will be used to assign ages to the adult chum salmon run and estimate overall survival by brood year. Plankton tows will be conducted in Kitoi Bay to ascertain the timing of plankton blooms and to assess general ocean conditions prior to and after the release of pink and chum salmon fry. Prior to saltwater rearing, coho salmon smolt will also be sampled for biological data and osmocompetence.

LITERATURE CITED

Brennan, K., D. Gretsch, and J. Wadle. 2003. Kodiak management area harvest strategy for the 2003 commercial salmon season. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K03-26, Kodiak.

Clevenger C., S. G. Honnold, and J. N. McCullough. 1997. Pillar Creek Hatchery annual management plan, 1997. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 4K97-31, Kodiak.

Hall A., S. G. Honnold, J. N. McCullough, and S.T. Schrof. 1999. Kitoi Bay Hatchery annual management plan, 1999. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K99-43, Kodiak.

Honnold, S. G. 1997. The results of sockeye salmon (*Oncorhynchus nerka*) stocking into Spiridon Lake in the Kodiak National Wildlife Refuge: juvenile and adult production, commercial harvest, and ecosystem effects, 1987-1996. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 4K97-47, Kodiak.

Honnold, S.G. and C. Clevenger. *In press*. Pillar Creek Hatchery annual management plan, 2003. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K03-xx, Kodiak.

McCullough, J.N. and A.W. Aro. 2001. Kitoi Bay Hatchery annual management plan, 2001. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K01-42, Kodiak.

McCullough, J.N. and A.W. Aro. 2002. Kitoi Bay Hatchery annual management plan, 2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K02-41, Kodiak.

McCullough, J.N. and S.C. Clevenger. 2002. Pillar Creek Hatchery annual management plan, 2002. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K02-38, Kodiak.

McGee, S.G. 1995. The hatchery program and protection of wild salmon in Alaska: policies and regulations. Alaska Department of Fish and Game, Division of Commercial Fisheries, Draft Report (compilation), Juneau.

Schrof, S.T., S.G. Honnold, C. Hicks, and J. Wadle. 2000. A summary of salmon enhancement, rehabilitation, evaluation, and monitoring efforts conducted in the Kodiak Management Area through 1998. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K00-57, Kodiak.

Schrof, S.T. and S.G Honnold. *In press*. A summary of salmon enhancement, rehabilitation, evaluation, and monitoring efforts conducted in the Kodiak Management Area through 2001. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K03-xx, Kodiak.

Table 1. Salmon egg takes (2002), planned releases (2003-2004), projected returns (2004-2008), and fish transport permits (FTP), Kodiak Management Area.

Release	Egg Take		Releases			Adult Returns[a]							
Site	eggs	adults	Number	Size (g)	Date	2004	2005	2006	2007	2008	Total	Number	Expires
Pink Salmon: Kitoi Bay Hatchery Stock												01A-0102	8/30/06
Kitoi Bay[a]	190,655,628	376,386	142,000,000	0.75/FF	05/23/03	7,100,000	0	0	0	0	7,100,000	01A-0102	8/30/06
Chum Salmon: Kitoi Bay Hatchery Stock												01A-0103	8/31/06
Kitoi Bay[b]	25,940,633	55,523	20,000,000	1.75/FF	05/23/03	0	62,800	274,800	62,000	4,000	403,600	01A-0103	8/31/06
Coho Salmon: Kitoi Bay Hatchery Stock												02A-0007	5/1/12
Kitoi Bay[c]	1,300,000	1,040	1,060,000	18.0/S	05/30/03	159,000	0	0	0	0	159,000	02A-0007	5/1/12
												02A-0009	5/1/12
Jennifer Lake[d]	300,000	240	200,000	0.75/FG	06/15/03	0	4,000	0	0	0	4,000	02A-0009	5/1/12
												02A-0011	5/1/12
Ruth Lake[d]	60,000	48	30,000	0.75/FG	06/15/03	0	600	0	0	0	600	02A-0011	5/1/12
												02A-0008	5/15/12
Crescent Lake[d]	600,000	480	165,000	0.75/FG	06/15/03	0	3,300	0	0	0	3,300	02A-0008	5/15/12
												02A-0010	5/1/12
Katmai Lake[d]	40,000	32	15,000	7.0/PS	10/01/03	0	1,500	0	0	0	1,500	02A-0010	5/1/12
Kitoi Bay[d]	1,300,000	1,040	1,000,000	20.0/S	06/01/04	0	150,000	0	0	0	150,000	02A-0007	5/1/12
Total Coho[d]:	2,300,000	1,840	1,470,000	released in 2003		159,000	159,400	0	0	0	318,400		
Actual:	2,319,197	13,428											
Sockeye Salmon: Saltery Lake Stock													
Little Kitoi Lake[e]	133,000	84	100,000	11.0/PS	10/01/03		95	2,740	2,005	155	4,995	97A-0068	12/31/08
	266,000	166	200,000	18.0/PS	05/01/04		570	16,440	12,030	930	29,970	02A-0060	2/1/04
Total Sockeye	399,000	250	300,000				665	19,180	14,035	1,085	34,965		
Grand Total:	216,995,261	432,159	163,770,000			7,259,665	241,380	288,835	63,085	38,965	7,822,000		

FF-Fed fry, FG-Fingerling, PS-Pre-smolt, S-Smolt

[a] Assuming 5.0% ocean survival for pink salmon.

[b] Assuming 2.0% ocean survival for chum salmon and 15.7% as 0.2, 68.7% as 0.3, 15.5% as 0.4 and .1% 0.5 returning adults.

[c] Brood Year 2001. Assuming 15.0% ocean survival for smolt release, 2% for fingerling release and 5% for presmolt release.

[d] Brood year 2002.

[e] Assuming 50% survival from fall outstocking to spring outmigration. Assuming 10% ocean survival for fall presmolt and 15% ocean survival for spring presmolt. Saltery return based on 1.9% as 1.1, 54.8% as 1.2, 35.3% as 1.3, 4.8 % as 2.2 and 3.1% as 2.3.

[f] FTP will be re-submitted for renewal upon expiration to allow stocking of presmolt in May 2004.

Table 2. Salmon egg takes (2003), planned releases (2004-2005), projected returns (2005-2009), and fish transport permits (FTP), Kodiak Management Area.

Release	Egg Take		Releases			Adult Returns[a]						F	
Site	eggs	adults	Number	Size	Date	2005	2006	2007	2008	2009	Total	Number	Expires
Pink Salmon: Kitoi Bay Hatchery Stock												01A-0102	8/30/06
Kitoi Bay[a]	185,000,000	350,000	142,000,000	0.65/FF	05/23/04	7,100,000	0	0	0	0	7,100,000	01A-0102	8/30/06
Chum Salmon: Kitoi Bay Hatchery Stock												01A-0103	8/31/06
Kitoi Bay[b]	25,000,000	30,000	22,000,000	1.75/FF	05/23/04	0	69,080	302,280	68,200	4,400	439,560	01A-0103	8/31/06
Coho Salmon: Kitoi Bay Hatchery Stock												02A-0007	5/1/12
Kitoi Bay[c]	1,300,000	1,040	1,000,000	20.0/S	05/30/04	150,000	0	0	0	0	150,000	02A-0007	5/1/12
												02A-0009	5/1/12
Jennifer Lake[d]	300,000	240	200,000	.75/FG	06/15/04	0	4,000	0	0	0	4,000	02A-0009	5/1/12
												02A-0011	5/1/12
Ruth Lake[d]	60,000	48	30,000	.75/FG	06/15/04	0	600	0	0	0	600	02A-0011	5/1/12
												02A-0008	5/15/12
Crescent Lake[d]	600,000	480	165,000	.75/FG	06/15/04	0	3,300	0	0	0	3,300	02A-0008	5/15/12
												02A-0010	5/1/12
Katmai Lake[d]	40,000	32	15,000	7.0/PS	10/01/04	0	1,500	0	0	0	1,500	02A-0010	5/1/12
Kitoi Bay[d]	1,300,000	1,040	900,000	20.0/S	06/01/05	0	135,000	0	0	0	135,000	02A-0007	5/1/12
Total Coho[d]:	2,300,000	1,840	0 1,410,000	released in 2004		150,000	9,400	0	0	0	157,900		
Sockeye Salmon: Saltery Lake Stock													
Little Kitoi Lake[e]	133,000	84	100,000	11.0/PS	10/01/04		95	2,740	2,005	155	4,995	97A-0068	12/31/08
	266,000	166	200,000	18.0/PS	05/01/05		570	16,440	12,030	930	29,970	02A-0060[f]	2/1/04
Total Sockeye	399,000	250	300,000				665	19,180	14,035	1,085	34,965		
Grand Total:	212,699,000	382,090	165,710,000			7,250,000	79,145	321,460	82,235	5,485	7,732,425		

FF-Fed fry, FG-Fingerling, PS-Pre-smolt, S-Smolt

[a] Assuming 5.0% ocean survival for pink salmon.

[b] Assuming 2.0% ocean survival for chum salmon and 15.7% as 0.2, 68.7% as 0.3, 15.5% as 0.4 and .1% 0.5 returning adults.

[c] Brood Year 2002. Assuming 15.0% ocean survival for smolt release, 2% for fingerling release and 5% for presmolt release.

[d] Brood year 2003.

[e] Assuming 50% survival from fall outstocking to spring outmigration. Assuming 10% ocean survival for fall presmolt and 15% ocean survival for spring presmolt. Saltery return based on 1.9% as 1.1, 54.8% as 1.2, 35.3% as 1.3, 4.8 % as 2.2 and 3.1% as 2.3.

[f] FTP will be re-submitted for renewal upon expiration to allow stocking of presmolt in October 2004 and May 2005.

Table 3. Forecasted runs, broodstock requirements, minimum escapements, and potential harvest of salmon returning to systems in 2003 as a result of prior Kitoi Bay Hatchery stockings.

Return Location[a]	Species	Forecasted Run			Broodstock Required	Minimum Escapement[b]	Potential Harvest[c]
		Point	Low	High			
Kitoi Bay Hatchery (Big Kitoi Creek)	Pink	8,613,388	5,568,869	10,250,390	350,000	15,000	8,248,388
	Chum	563,158	422,369	703,948	30,000	2,000	531,158
	Coho	159,867	121,986	192,669	6,000	0	153,867
Jennifer Lakes	Coho	3,300	2,000	4,600	0	0	3,300
Little Kitoi Lake	Sockeye[d]	7,700	5,100	10,200	2,450	0	7,700[e]
	Coho	500			0	500	
Crescent Lake	Coho	6,600	3,300	9,900	0	0	6,600
Katmai Creek	Coho	1,500	800	2,200	0	0	1,500
Saltery Lake[f]	*Sockeye*				*2,450*	*15,000*	

[a] Big Kitoi Creek is where adults returning to KBH imprint and enter the hatchery egg-take systems.

[b] Minimum escapement for BKC refers to the number of adults remaining in the creek after KBH has completed the egg-takes. These fish are allowed entry into the creek to spawn to continue the run in the event of the loss of the hatchery rearing fish.

[c] Projected harvest is the run minus broodstock and escapement needs Note: the 2003 KMA Harvest Strategy does includes the escapements as part of projected harvest.

[d] An estimated 2,900 additional sockeye salmon of Saltery Lake stock are projected to return to the Kitoi Bay area (Ruth Lake) as a result of stocking from Pillar Creek Hatchery (Honnold and Clevenger in press).

[e] Returns of sockeye salmon (Saltery Lake broodstock) to Little Kitoi Lake may be harvested incidentally in the Kitoi area fishery; however, no targeted fishery will take place in order to allow as many adults to enter the lake for broodstock collection. The broodstock collection will be used for Kitoi Bay Hatchery needs to continue releases at Little Kitoi Lake for broodstock development and may also be used to provide eggs to Pillar Creek Hatchery for stocking of Spiridon Lake in 2004. Egg take may occur in 2003 if sufficient adults are counted through the fish pass into the lake. Broodstock numbers include 2,200 for Pillar Creek Hatchery (Spiridon Lake stocking) and 250 for KBH for continued broodstock development (Little Kitoi Lake stocking).

[f] Saltery Lake egg take will occur if insufficient adults are available for a Little Kitoi egg take. If the lower range of the Biological Escapement Goal (15,000) is met, the egg take can proceed at Saltery Lake in 2003.

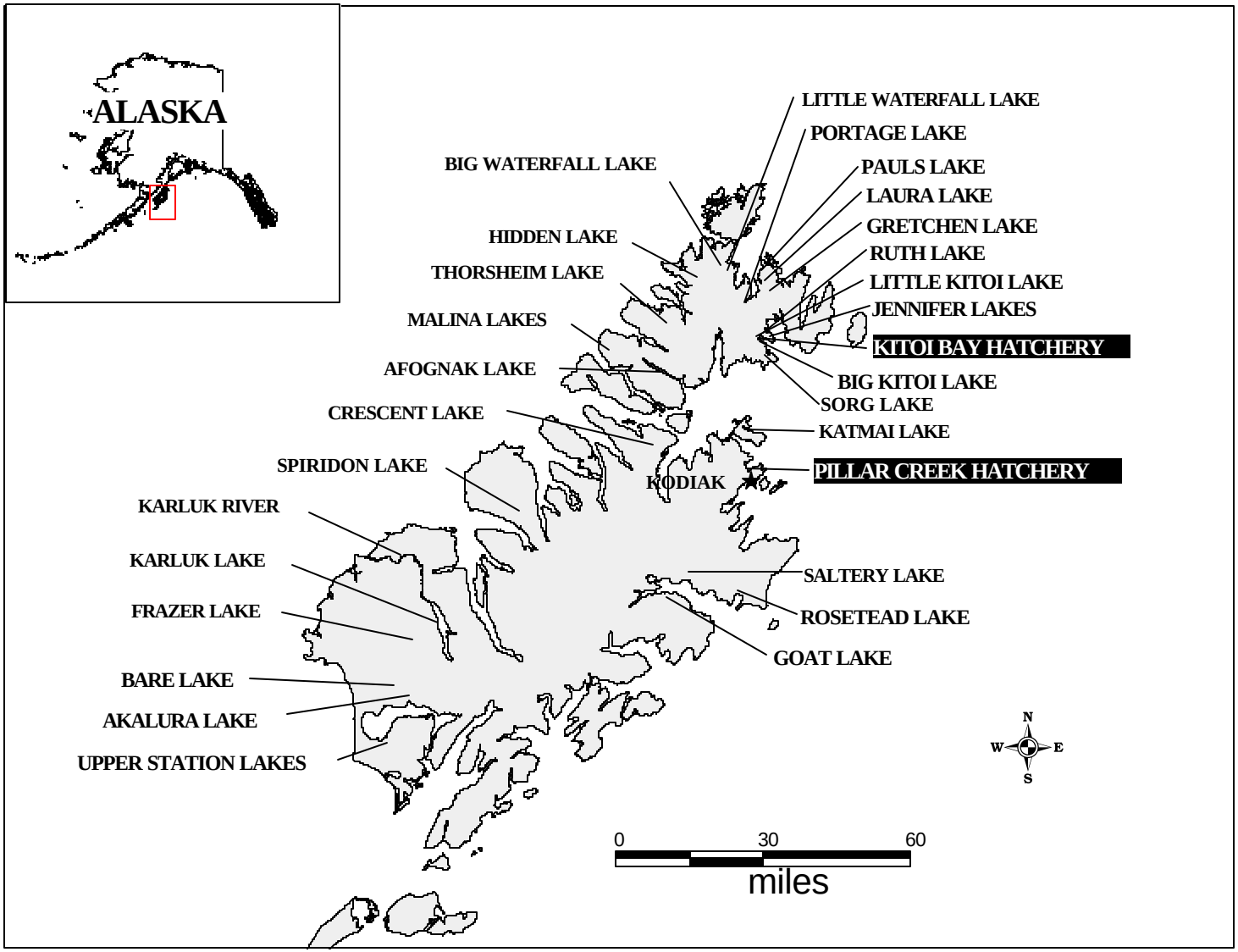

Figure 1. Locations of sockeye salmon enhancement and rehabilitation projects on Kodiak and Afognak Islands, 1951-2003.

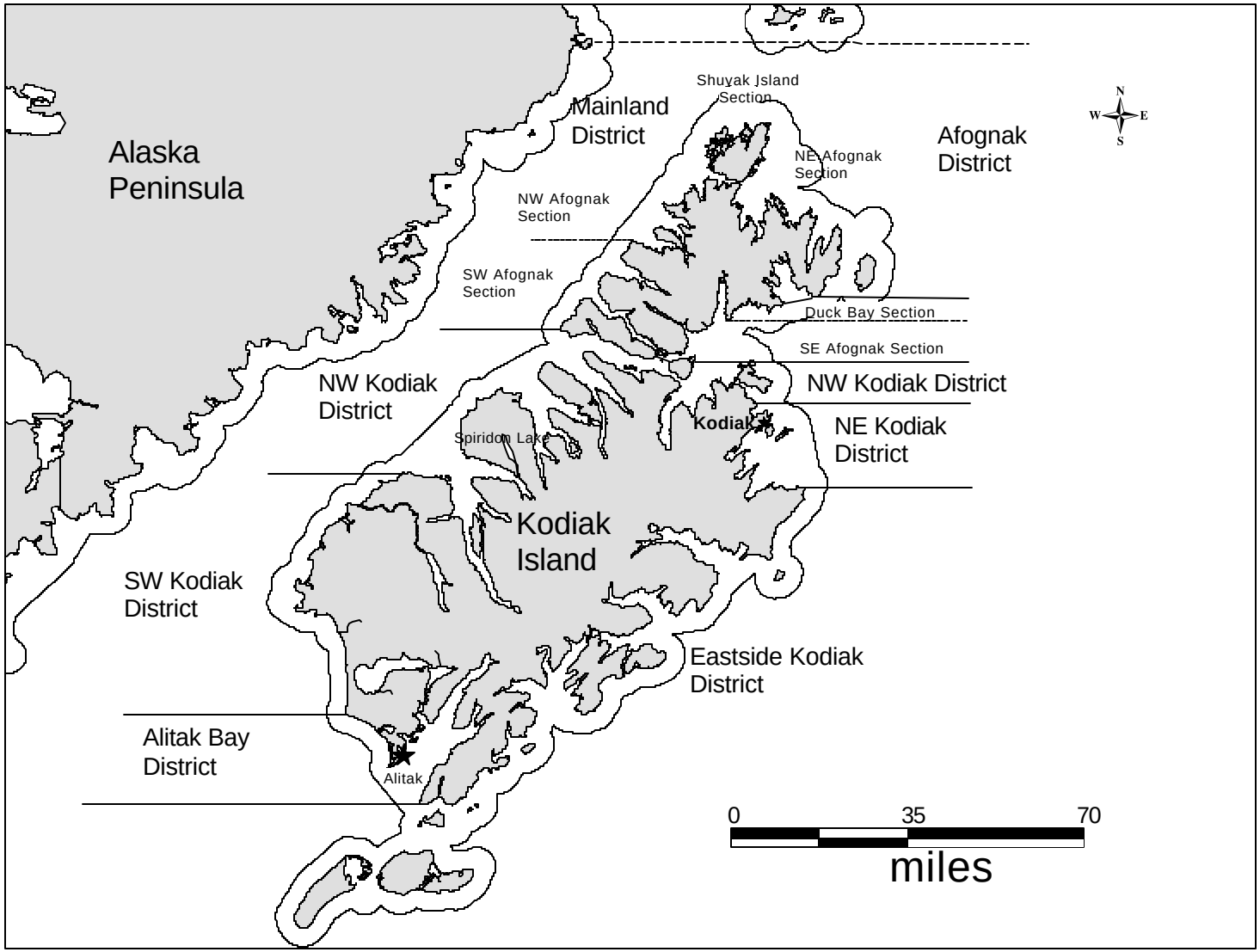

Figure 2. Map of the Kodiak Management Area depicting commercial fishing districts and selected sections.

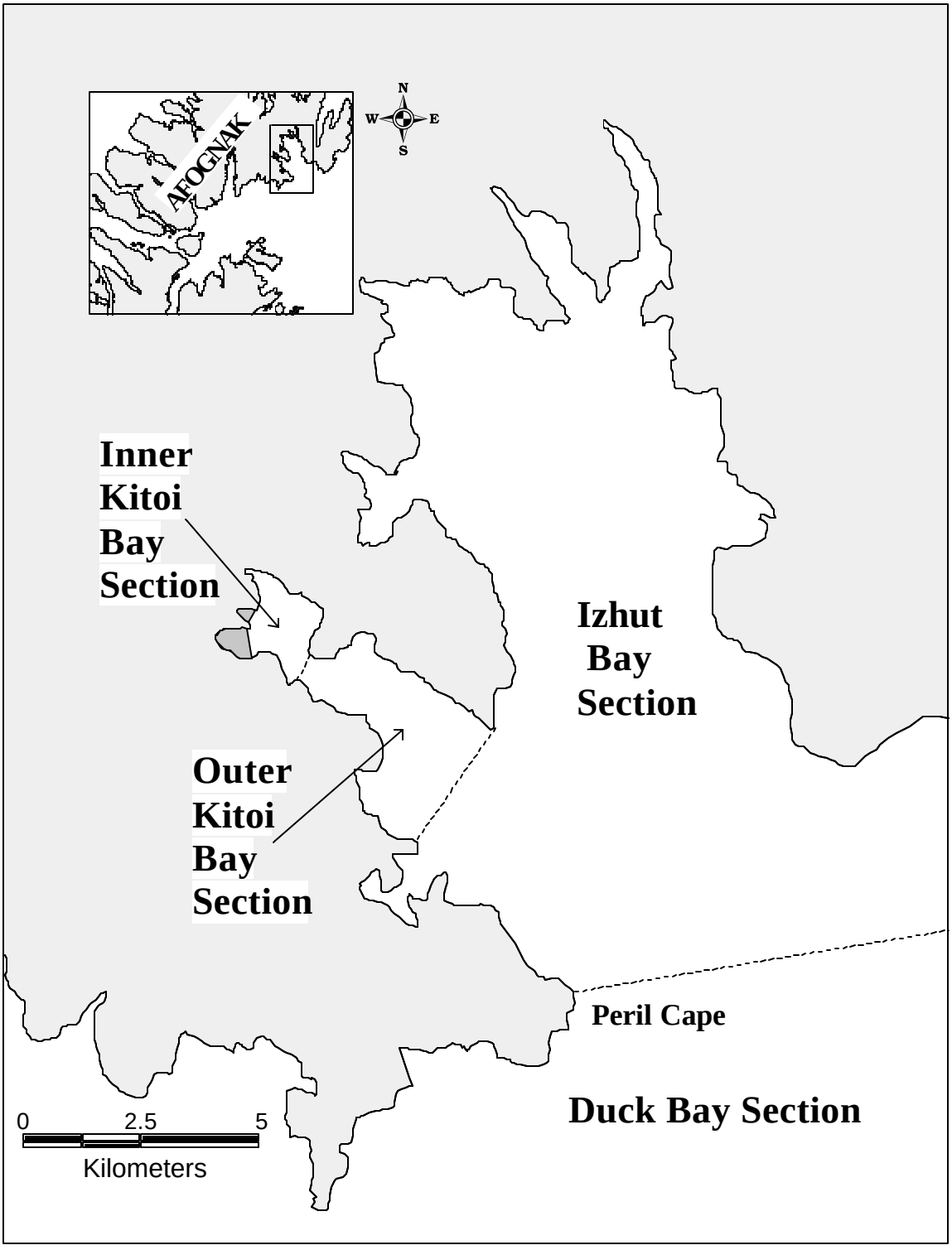

Figure 3. Map of Izhut (252-30), Duck (252-31), and Inner and Outer Kitoi Bay (252-32) Sections.

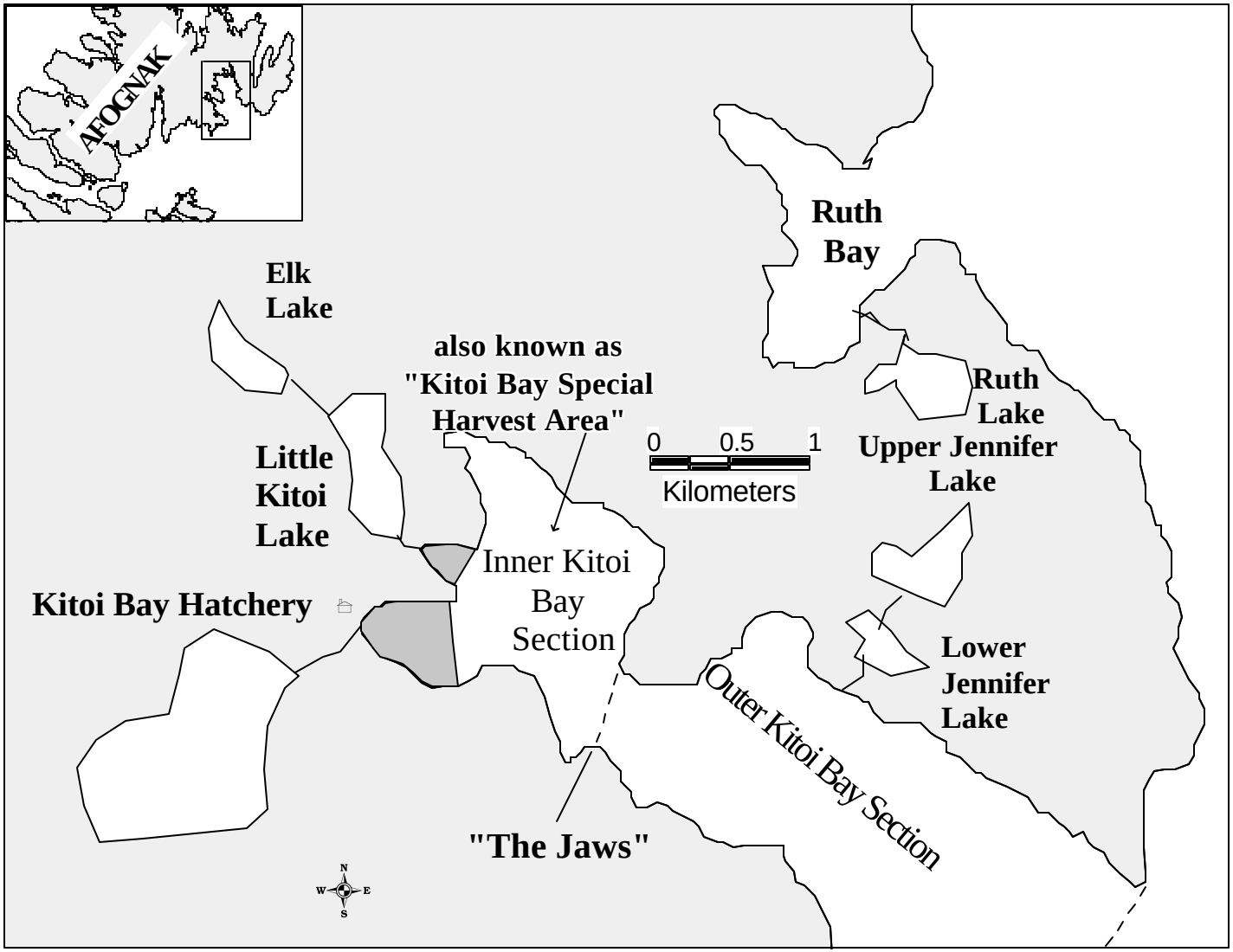

Figure 4. Map of Inner and Outer Kitoi Bay Sections (252-32). Cross-hatched areas are closed to commercial fishing.

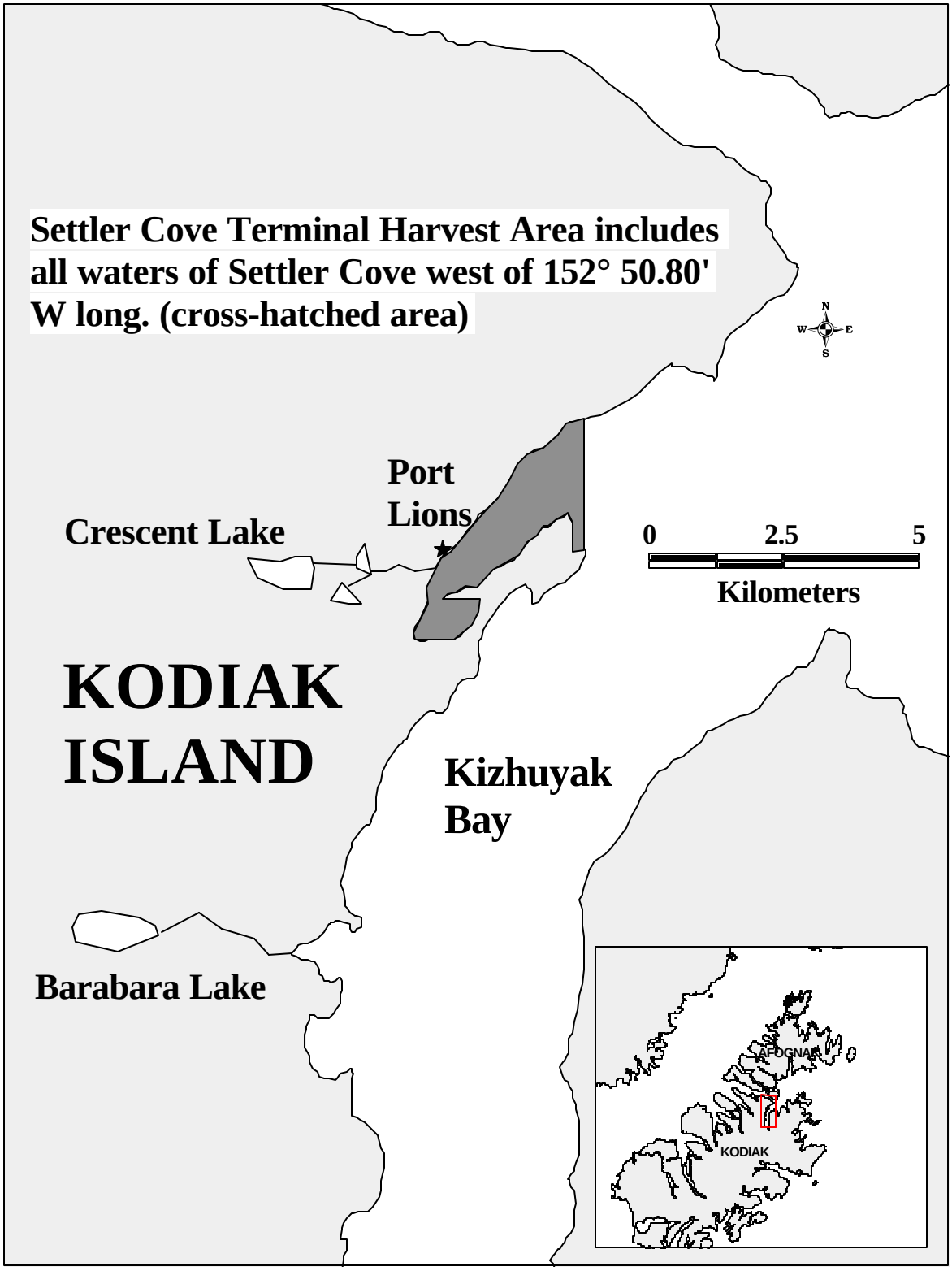

Figure 5. Settler Cove (Crescent Lake) terminal harvest area boundaries in Kizhuyak Bay.

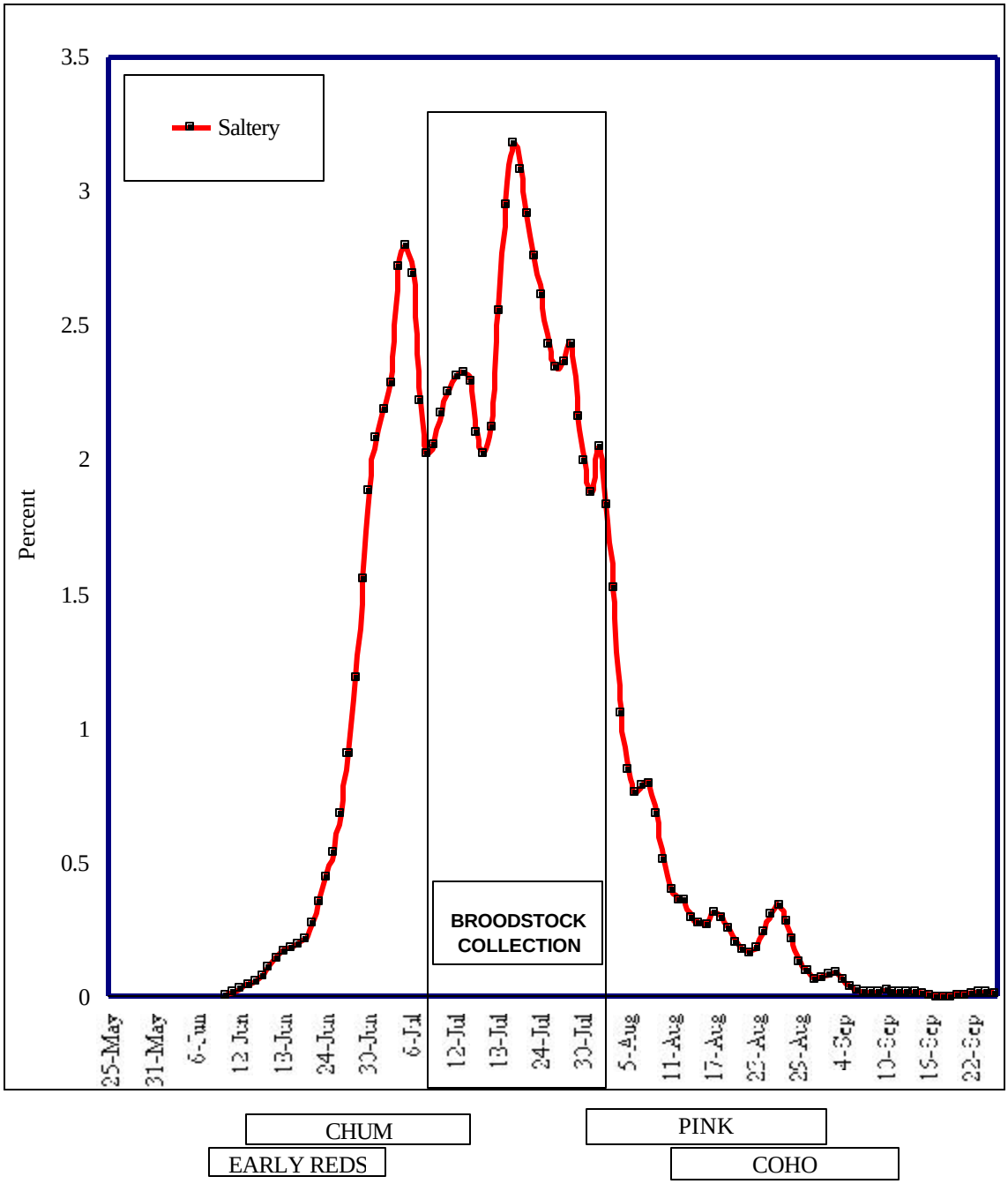

Figure 6. The run timing of salmon stocks returning to the Kitoi Bay Hatchery compared to the late-run Saltery sockeye salmon broodstock collection.

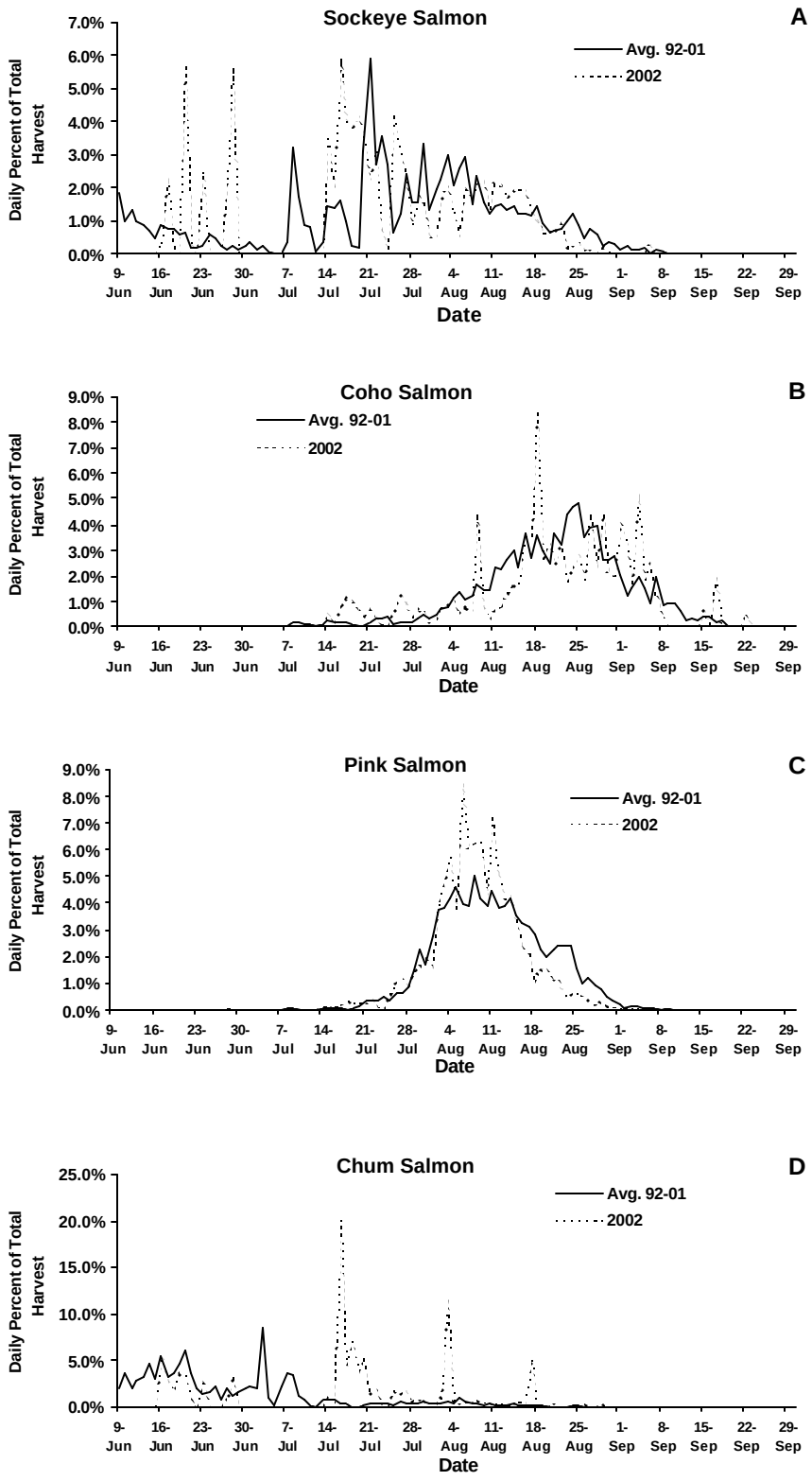

Figure 7. Sockeye (A), coho (B), pink (C), and chum (D) salmon average (1992-2002) harvest timing compared to 2002 harvest timing in the Izhut, Duck, and Kitoi Bay Sections combined.

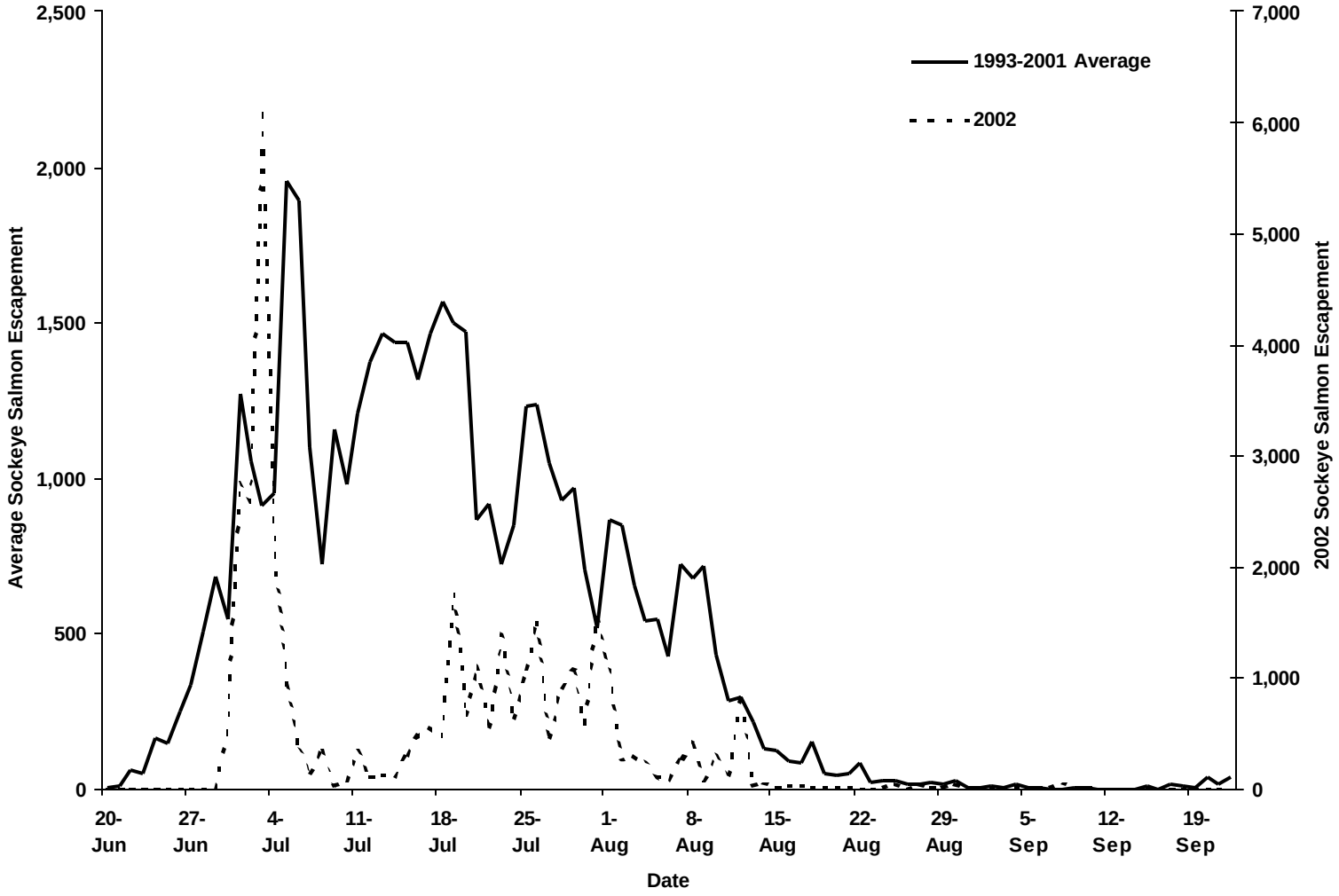

Figure 8. Saltery lake sockeye salmon average escapement (1993-2001) compared to the 2002 escapement.

APPENDIX

Appendix A. Salmon survival assumptions used to estimate returns for Kitoi Bay Hatchery.

Species	Life Stage	Life Stage	Percent Survival
Pink	Egg	Fry	87%
Chum	Egg	Fry	84%
Coho	Egg	Fry	88%

Species	Life Stage	Size (g)	Survival to Adult[a]	
			FW release	SW Release
Pink	Fed Fry (FF)	0.65		5.0%
Chum	Fed Fry (FF)	1.75		2.0%
Coho	Fed Fry (FF) or Fingerling (FG)	0.75-1.5	2%	
Coho	Presmolt(PS)	5.0-7.0	5%	
Coho	Age-1. Smolt (S)	20.0		15.0%
Sockeye	Presmolt (PS)	10.0	10%	
Sockeye	Age-1. Smolt (S)	10.0		10%

FW = Freshwater
SW = Saltwater
[a] Based on known survivals from previous years releases and resultant returns.

Appendix B. Kitoi Bay Hatchery pink salmon release history, brood years 1972-2001.

Brood	Pink Salmon Releases[a]		
Year	Year	Number	Size (g)
1972	1973	493,130	
1973	1974	447,642	
1974	1975	1,226,314	
1975	1976	2,486,410	
1976	1977	4,722,152	0.50
1977	1978	17,255,424	0.44
1978	1979	17,319,537	
1979	1980	22,458,947	0.63
1980	1981	26,351,664	0.93
1981	1982	47,828,701	
1982	1983	72,054,096	0.79
1983	1984	87,065,569	0.58
1984	1985	75,109,442	0.29
1985	1986	97,773,052	0.78
1986	1987	90,017,823	0.27
1987	1988	94,172,516	0.73
1988	1989	80,502,220	0.62
1989	1990	84,907,550	0.61
1990	1991	124,148,019	0.60
1991	1992	147,145,130	0.80
1992	1993	169,552,112	0.51
1993	1994	163,192,575	0.45
1994	1995	134,104,406	0.53
1995	1996	144,045,245	0.48
1996	1997	102,583,724	0.50
1997	1998	128,101,460	0.50
1998	1999	127,685,500	0.54
1999	2000	137,702,154	0.61
2000	2001	134,823,670	0.72
2001	2002	152,990,900	0.56

[a] Big Kitoi Creek broodstock; juveniles (fry lifestage) were released into Big Kitoi Bay net pens for rearing, then released into Big Kitoi Bay.

Appendix C. Kitoi Bay Hatchery chum salmon release history, brood years 1981-2001.

Brood Year	Chum Salmon Releases[a]			Return Years
	Year	Number	Size (g)	
1981	1982	36,846	0.56	1983-1986
1982	1983	105,058	1.05	1984-1987
1983	1984	630,422	1.16	1985-1988
1984	1985	784,078	0.67	1986-1989
1985	1986	414,233		1987-1990
1986	1987	693,166	2.00	1988-1991
1987	1988	4,737,587	2.10	1989-1992
1988	1989	3,289,878	1.85	1990-1993
1989	1990	1,502,501	2.44	1991-1994
1990	1991	0		
1991	1992	22,214,472	1.80	1993-1996
1992	1993	10,101,986	2.02	1994-1997
1993	1994	6,507,497	1.52	1995-1998
1994	1995	9,738,472	1.51	1996-1999
1995	1996	20,139,843	1.27	1997-2000
1996	1997	23,500,000	1.50	1998-2001
1997	1998	12,310,015	1.50	1999-2002
1998	1999	6,859,982	1.02	2000-2003
1999	2000	22,334,640	1.70	2001-2004
2000	2001	20,032,140	1.73	2002-2005
2001	2002	19,593,070	1.55	2003-2006

[a] Big Kitoi Creek broodstock; juveniles (fry lifestage) were released into Big Kitoi Bay net pens for rearing, then released into Big Kitoi Bay.

Appendix D. Kitoi Bay Hatchery coho salmon release history, brood years 1982-2001.

Brood		Coho Salmon Releases					Return
Year	Brood Stock	Year	Number	Size (g)	Life stage	Location	Year
1982	Buskin	1983	77,348	0.85	Fingerling	Buskin Lake	1985
1983	Buskin	1984	43,288	0.64	Fingerling	Buskin Lake	1986
1983	Little Kitoi Lake	1984	131,825	0.96	Fingerling	Kodiak Road System	1986
1983	Little Kitoi Lake	1984	5,000	2.54	Fingerling	Shemya	1986
1983	Little Kitoi Lake	1984	127,700	1.00	Fingerling	Little Kitoi Lake	1986
1984	Buskin	1985	45,645	1.88	Fingerling	Buskin Lake	1987
1984	Little Kitoi Lake	1985	109,568	0.90	Fingerling	Kodiak Road System	1987
1984	Little Kitoi Lake	1985	33,472	1.50	Fingerling	Little Kitoi Lake	1987
1984	Little Kitoi Lake	1985	12,731	2.60	Fingerling	Kodiak Road System	1987
1985	Buskin	1986	50,024	0.79	Fingerling	Buskin Lake	1988
1985	Little Kitoi Lake	1986	141,750	1.08	Fingerling	Kodiak Road System	1988
1985	Little Kitoi Lake	1986	53,360	6.10	Presmolt	Little Kitoi Lake	1988
1986	Little Kitoi Lake	1987	103,824	1.03	Fingerling	Kodiak Road System	1989
1986	Little Kitoi Lake	1987	171,103	1.79	Fingerling	Little Kitoi Lake	1989
1986	Little Kitoi Lake	1987	9,600	5.00	Presmolt	Big Kitoi Creek	1989
1986	Little Kitoi Lake	1987	22,349	0.50	Fingerling	Katmai Creek	1989
1987	Little Kitoi Lake	1988	84,600	1.18	Fingerling	Kodiak Road System	1990
1987	Little Kitoi Lake	1988	43,807	1.52	Fingerling	Little Kitoi Lake	1990
1987	Little Kitoi Lake	1988	241,373	1.13	Fingerling	Crescent Lake	1990
1987	Little Kitoi Lake	1988	20,000	0.70	Fingerling	Katmai Creek	1990
1987	Little Kitoi Lake	1988	137,585	1.13	Fingerling	Hidden Lake	1990
1988	Little Kitoi Lake	1989	87,585	0.80	Fingerling	Kodiak Road System	1991
1988	Little Kitoi Lake	1990	137,493	23.30	Smolt	Big Kitoi Creek	1991
1988	Little Kitoi Lake	1989	202,955	0.82	Fingerling	Crescent Lake	1991
1988	Little Kitoi Lake	1989	239,817	0.85	Fingerling	Hidden Lake	1991
1989	Little Kitoi Lake	1990	36,040	1.75	Fingerling	Kodiak Road System	1992
1990	Little Kitoi Lake	1991	83,530	1.24	Fingerling	Kodiak Road System	1993
1990	Little Kitoi Lake	1992	60,755	32.00	Smolt	Big Kitoi Creek	1993
1990	Little Kitoi Lake	1991	191,416	1.10	Fingerling	Crescent Lake	1993
1990	Little Kitoi Lake	1991	250,889	1.25	Fingerling	Hidden Lake	1993
1991	Little Kitoi Lake	1992	51,500	1.60	Fingerling	Kodiak Road System	1994
1991	Little Kitoi Lake	1992	15,200	8.00	Presmolt	Kodiak Road System	1994
1991	Little Kitoi Lake	1992	69,100	7.04	Presmolt	Crescent Lake	1994
1991	Little Kitoi Lake	1992	14,973	8.00	Presmolt	Katmai Lake	1994
1991	Little Kitoi Lake	1992	162,387	4.50	Fingerling	Jennifer Lakes	1994
1991	Little Kitoi Lake	1992	70,605	1.40	Fingerling	Little Kitoi Lake	1994
1991	Little Kitoi Lake	1993	613,681	18.90	Smolt	Big Kitoi Creek	1994
1992	Little Kitoi Lake	1993	64,000	1.76	Fingerling	Kodiak Road System	1995
1992	Little Kitoi Lake	1993	68,420	14.60	Presmolt	Crescent Lake	1995
1992	Little Kitoi Lake	1993	15,052	14.60	Presmolt	Katmai Lake	1995
1992	Little Kitoi Lake	1993	135,486	1.94	Fingerling	Jennifer Lakes	1995

-Continued-

Appendix D. (page 2 of 2)

Brood		Coho Salmon Releases					Return
Year	Brood Stock	Year	Number	Size (g)	Life stage	Location	Year
1992	Little Kitoi Lake	1993	139,147	1.30	Fingerling	Little Kitoi Lake	1995
1992	Little Kitoi Lake	1993	5,163	14.60	Presmolt	Big Kitoi Creek	1995
1992	Little Kitoi Lake	1994	97,973	28.40	Smolt	Big Kitoi Creek	1995
1993	Big Kitoi Creek	1994	163,680	0.98	Fingerling	Crescent Lake	1996
1993	Big Kitoi Creek	1994	13,178	23.28	Presmolt	Katmai Lake	1996
1993	Big Kitoi Creek	1995	258,926	25.90	Smolt	Big Kitoi Creek	1996
1994	Big Kitoi Creek	1995	167,778	1.16	Fingerling	Crescent Lake	1997
1994	Big Kitoi Creek	1995	165,000	1.46	Fingerling	Jennifer Lakes	1997
1994	Big Kitoi Creek	1995	59,500	1.74	Fingerling	Ruth Lake	1997
1994	Big Kitoi Creek	1995	28,350	2.41	Fingerling	Finger Lake	1997
1994	Big Kitoi Creek	1995	59,030	2.50	Fingerling	Elk Lake	1997
1994	Big Kitoi Creek	1995	16,489	5.87	Presmolt	Katmai Lake	1997
1994	Big Kitoi Creek	1996	894,486	23.54	Smolt	Big Kitoi Creek	1997
1995	Big Kitoi Creek	1996	163,200	0.40	Fry	Crescent Lake	1998
1995	Big Kitoi Creek	1996	15,246	5.04	Presmolt	Katmai Lake	1998
1995	Big Kitoi Creek	1997	819,046	19.57	Smolt	Big Kitoi Creek	1998
1996	Big Kitoi Creek	1997	35,000	0.35	Fry	Ruth Lake	1999
1996	Big Kitoi Creek	1997	163,000	0.35	Fry	Jennifer Lakes	1999
1996	Big Kitoi Creek	1997	165,000	0.35	Fry	Crescent Lake	1999
1996	Big Kitoi Creek	1997	15,735	7.33	Presmolt	Katmai Lake	1999
1996	Big Kitoi Creek	1998	769,000	23.90	Smolt	Big Kitoi Creek	1999
1997	Big Kitoi Creek	1998	163,000	0.60	Fry	Crescent Lake	2000
1997	Big Kitoi Creek	1998	35,000	0.50	Fry	Ruth Lake	2000
1997	Big Kitoi Creek	1998	165,000	0.50	Fry	Jennifer Lakes	2000
1997	Big Kitoi Creek	1999	1,098,338	19.30	Smolt	Big Kitoi Creek	2000
1998	Big Kitoi Creek	1999	35,000	0.57	Fry	Ruth Lake	2001
1998	Big Kitoi Creek	1999	136,000	0.55	Fry	Jennifer Lake	2001
1998	Big Kitoi Creek	1999	165,000	0.57	Fry	Crescent Lake	2001
1998	Big Kitoi Creek	1999	15,000	8.23	Presmolt	Katmai Lake	2001
1998	Big Kitoi Creek	2000	871,448	16.92	Smolt	Big Kitoi Creek	2001
1999	Big Kitoi Creek	2000	30,695	0.72	Fry	Ruth Lake	2002
1999	Big Kitoi Creek	2000	155,688	0.44	Fry	Jennifer Lake	2002
1999	Big Kitoi Creek	2000	165,837	0.42	Fry	Crescent Lake	2002
1999	Big Kitoi Creek	2000	15,000	7.40	Presmolt	Katmai Lake	2002
1999	Big Kitoi Creek	2001	936,913	20.76	Smolt	Big Kitoi Creek	2003
2000	Big Kitoi Creek	2001	120,000	0.86	Fry	Jennifer	2003
2000	Big Kitoi Creek	2001	165,000	0.90	Fry	Crescent Lake	2003
2000	Big Kitoi Creek	2001	15,000	8.37	Presmolt	Katmai Lake	2003
2000	Big Kitoi Creek	2002	1,041,342	16.90	Smolt	Big Kitoi Creek	2004
2001	Big Kitoi Creek	2002	201,320	0.57	Fry	Jennifer	2004
2001	Big Kitoi Creek	2002	164,487	0.65	Fry	Crescent Lake	2004
2001	Big Kitoi Creek	2002	15,000	6.23	Presmolt	Katmai Lake	2004
2001	Big Kitoi Creek	2002	30,000	0.69	Fry	Ruth Lake	2004

Appendix E. Kitoi Bay Hatchery sockeye salmon release history, brood years 1988-2001.

Brood		Sockeye Salmon Releases				
Year	Brood Stock	Year	Number	Size (g)	Life stage	Location
1988	Upper Station	1989	143,725	2.48	Zero Check Smolt	Little Kitoi Bay
1989	Upper Station	1990	249,346	0.20	Fry	Spiridon
		1990	241,000	0.50	Fingerling	Little Kitoi Lake
		1990	337,932	0.18	Fry	Little Kitoi Lake
		1990	854,610	3.23	Zero Check Smolt	Little Kitoi Bay
		1990	458,118	0.48	Zero Check Fingerling	Little Kitoi Bay
1990	Upper Station	1991	1,250,000	2.50	Zero Check Smolt	Little Kitoi Bay
1991	Upper Station	1992	1,463,000	1.60	Zero Check Smolt	Little Kitoi Bay
1992	Upper Station	1993	52,418	3.13	Presmolt	Little Kitoi Lake
		1993	180,000	0.50	Fingerling	Jennifer Lakes
		1994	326,500	15.00	Smolt	Little Kitoi Bay
1993	Upper Station	1994	1,672,710	1.11	Zero Check Smolt	Little Kitoi Bay
	Little Kitoi Lake	1994	10,108	4.60	Presmolt	Little Kitoi Lake
		1995	916,677	10.08	Smolt	Little Kitoi Bay
1994	Upper Station	1995	266,952	1.83	Zero Check Smolt	Little Kitoi Lake
	Little Kitoi Lake	1995	84,861	4.98	Presmolt	Little Kitoi Lake
		1996	573,242	12.70	Smolt	Little Kitoi Bay
1995	Little Kitoi Lake	1996	155,687	3.16	Presmolt	Little Kitoi Lake
	Upper Station	1997	587,435	12.10	Smolt	Little Kitoi Bay
1996	Little Kitoi Lake	1997	77,039	3.31	Presmolt	Little Kitoi Lake
	Little Kitoi Lake	1997	99,085	11.70	Presmolt	Little Kitoi Lake
	Little Kitoi Lake	1998	397,000	15.10	Smolt	Little Kitoi Bay
1997	Saltery Lake	1999	106,658	17.70	Smolt	Little Kitoi Lake
1998	Saltery Lake	1999	98,737	7.00	Fingerling	Little Kitoi Lake
		1999	74,463	14.63	Presmolt	Little Kitoi Lake
		1999	23,756	14.35	Presmolt	Little Kitoi Bay[a]
1999	Saltery Lake	2000	154,039	11.31	Presmolt	Little Kitoi Lake
2000	Saltery Lake	2001	282,089	9.53	Presmolt	Little Kitoi Lake
2001	Saltery Lake	2002	212,418	6.55	Presmolt	Little Kitoi Lake

[a] This release resulted from a dissolved oxygen crash in the transfer tank.

Appendix F. Little Kitoi Lake sockeye salmon egg takes, and eggs incubated and reared at Kitoi Bay Hatchery, 1993-1996.

Brood Year	Number Adults	Eggs (millions)	Number Released	Year Stocked	Life Stage	Stocking Location
1993	1,050	1.10	10,108	1994	Presmolt	Little Kitoi Lake
			916,677	1995	Smolt	Little Kitoi Bay
1994	600	1.50	84,861	1995	Presmolt	Little Kitoi Lake
			573,242	1996	Smolt	Little Kitoi Bay
1995	155	0.19	155,687	1996	Presmolt	Little Kitoi Lake
1996	1,210	1.20	77,039	1997	Presmolt	Little Kitoi Lake
			99,085	1998	Presmolt	Little Kitoi Lake

Appendix G. Unplanned Cost Recovery General Operational Plan

A management strategy targeting unharvested enhanced production is required by ADFG to insure compliance with 5AAC 40.005.(f). This strategy, as drafted here by KRAA, represents a pre-Program Alteration Request (PAR) effort to address ADFG PNP permitting requirements for salmon straying concerns. Identified below is a proposed procedure detailing actions required when harvest of enhanced production is delayed or abandoned:

PCH Basic Management Plan: (proposed [deletions] and *additions*)

Sec. 4.02 Management Strategies For [potential hatchery production] Enhanced Production:

c. *When events result in enhanced salmon production remaining unharvested, a Regional Planning Team (RPT) approved management strategy, in the form of an 'unplanned' cost recovery operational plan (UCROP) will be implemented.* A *UCROP identifies that:*

i. *Enhanced production should be harvested annually in common property fisheries (CPF) at a rate consistent with the average harvest timing, and the range thereof, for site-specific THA/SHA production;*
ii. *Historical harvest data will provide a guide to site-specific timing per donor stock used and related harvest rates;*
iii. *When such events as price disputes, ADEC-defined unfishable waters, etc. preclude the occurrence of normal common property harvest patterns associated with specific enhanced production, implementation of a UCROP will be considered;*
iv. *Resulting salmon build-ups will be identified by ADFG and, per established UCROP parameters, a site-specific unplanned cost recovery fishery (UCRF) will be initiated by KRAA;*
v. *These parameters include, but are not limited to, donor stock run timing per ADFG weir escapement data, average fishery time-of-entry (TOE) patterns per ADFG harvest data, and ADFG in-season estimates of salmon build-up magnitude and duration;*
vi. *UCRF will occur when, as a result of delayed CPF's, build-ups are estimated at 10%, 40%, and 50% of pre-season expectations for late-run sockeye, early-run sockeye and chums, and all pink and coho production, respectively;*
vii. Alternatively, a UCRF will occur on unharvested enhanced production at the donor stock's 50% TOE pattern for each enhancement site's THA/SHA;
viii. Applying percentages to build-up numbers for triggering UCRF's, addresses straying concerns related to build-up duration and also facilitates pre-season planning for UCRF;
ix. All UCRF will commence within 72 hours of the pertinent percentages being achieved and will occur per each site's normal CPF harvest patterns;
x. KRAA will be responsible for administrative compliance with the intent of each system's UCROP. All costs for and proceeds from UCRF will belong to KRAA.
xi. *Site-specific UCROP's will be developed by KRAA for the following non-anadromous enhancement projects:*
-Kitoi Bay Hatchery (KBH) juvenile releases:
** Chum @KBH; Pinks @KBH; Coho @KBH, @Jennifer Lks., @Ruth Lk., @Crescent Lk.,*
-Pillar Creek Hatchery (PCH) juvenile releases:
** Sockeye @Crescent Lk., @Hidden Lk., @Waterfall Lks., @Spiridon Lk., @Ruth Lk.*

d. Failure to comply with the requirements identified in (c.) may result in the voiding of pertinent PNP permits.
Note: the percentages used above reflect thresholds of concern initially identified during the 2002 price dispute.

SIGN-OFF

Andrew Aro: Kitoi Bay Hatchery Manager, KRAA — Date

Steve Honnold: Regional Resource Development Biologist, CFD — 6/25/03 Date

Jim McCullough: Regional Finfish Management Supervisor, CFD — 6/25/03 Date

Patti Nelson: Regional Finfish Research Supervisor, CFD — 6/25/03 Date

Kevin Brennan: Area Finfish Management Biologist, CFD — 6-25-03 Date

Denby Lloyd: Regional Supervisor, CFD — Date

Len Schwarz: Area Biologist, SFD — 6/26/03 Date

Barry Stratton: Regional Supervisor, SFD — 6/26/03 Date

Larry Malloy: Executive Director, KRAA — Date

The 2003 Hatchery Management Plan for KBH is hereby approved:

~~Kevin Duffy~~: Commissioner, ADF&G — 7/7/2003 Date

David Bedford Deputy